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HISTORY

OF

DENTAL AND ORAL SCIENCE

IN AMERICA.

PREPARED UNDER DIRECTION

OF THE

AMERICAN ACADEMY OF DENTAL SCIENCE.

PHILADELPHIA:
SAMUEL S. WHITE.
1876.

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PREFACE.

AT the monthly meeting, December, 1875, of the "American Academy of Dental Science," Dr. D. M. Parker, member of the Centennial Board of State Managers, and President of the Academy, in the Chair, it was voted unanimously that the Academy endeavor to present in some suitable manner the claims of Dentistry—or, more properly, of Oral Science—at the then coming Centennial Exhibition at Philadelphia.

A Committee was appointed to make the necessary arrangements, and weekly meetings were held from that time. In the month of February an arrangement was entered into with Mr. James E. Dexter, of New York, to collect and put into readable form such materials of historical value as could be obtained, in order to present an historical volume on American dentistry. In April an address was published in the dental periodicals calling upon the general profession for such assistance as they could render. It was as follows:

"*To the Dental Profession.*

"The American Academy of Dental Science, Boston, Mass., design presenting to the profession and the public, at the approaching Centennial, a view of American dentistry, past and present.

"One of the characteristics of this presentation will be, a history of the profession in this country for the past one hundred years. This work, being designed to become a standard of reference, will be comprehensive and complete in detail.

"To the end that this desirable result may be attained, the committee in charge respectfully request the aid of all dentists (and others) in furnishing information of every kind necessary to the work. Below will be found a list designed to afford a general idea of the kinds of information needed. On these and kindred subjects, and, indeed, on *any* subject connected with the profession, nothing will be regarded as too small or insignificant to be of value.

"If desired, any material received will be carefully preserved and returned to the sender after use. To facilitate this, as well as to insure credit being properly given, everything should be marked with the name and address of the sender.

"The Committee are persuaded that the importance of such a work to the profession can hardly be overrated. Several small works, able as far as they extend, have been put forth; but as yet nothing on the scale laid out for this work has appeared. The Committee feel assured, therefore, that they can rely on the hearty co-operation of the profession in furnishing the information above mentioned.

"*List of Subjects.*

"Biography, literature, societies, colleges, individuals, mechanical and operative dentistry, discoveries in any branch of the profession, materia medica, prominent events (with dates), prominent questions, inventions, patents, anecdotes, sayings, historical facts, obituaries, addresses, papers, published and unpublished works, etc., etc.

"Address communications and material to George T. Moffatt, M.D., No. 1, Hotel Boylston, Boston, Mass.; *or to* James E. Dexter, Care W. A. Bronson, M.D., No. 8 East 34th Street, New York city.

"*Advisory Committee.*

"Dr. A. L. Northrop, New York; Dr. W. W. Allport, Chicago; Dr. P. H. Austen, Baltimore; Dr. R. Arthur, Baltimore; Dr. J. H. McQuillen, Philadelphia; Dr. Edward Maynard, Washington; Dr. N. W. Kingsley, New York; Dr. J. Taft, Cincinnati; Dr. E. B. Gardette, Philadelphia; Dr. J. S. Knapp, New Orleans; Dr. J. W. White, Philadelphia; Dr. H. S. Chase, St. Louis; Dr. S. A. Bemis, Boston.

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In response to the above, historical material was, to some extent, voluntarily forwarded. The greatest portion of matter, however, ultimately came in response to personal requests by Mr. Dexter and the members of the committee; but the material thus collected has been, on the whole, small in amount. This has made much more difficult, and has greatly retarded, the preparation of the work; the comparatively early appearance of which is due chiefly to the untiring exertions of Mr. Dexter. Immediately upon his engagement he began with vigor to carry out his task. The short time he consumed in arranging and completing the work gives evidence of unremitting and well-directed labor.

The book has, perforce, been hastily written; but, as far as possible, no exertion has been spared to insure its accuracy. The committee has labored diligently and earnestly in the revision of Mr. Dexter's manuscript; and it is thought few errors of statement will be found. Expression of opinion by the writer or committee has been sought to be scrupulously avoided, and no unnecessary criticism of persons, books, or methods has been admitted; the effort being to make the work strictly historical, and in no sense didactic. That it contains all the facts cannot be hoped; but that most of its contents will be thought worthy of a place in history, that it will prove of interest to the present generation in enlightening them as to the work of their predecessors, and that it will be of value to the future historian and essayist in directing him to sources of information, and as a preservative of the fast-vanishing facts of the earlier days of American dentistry, is fully believed.

Indulgence is asked for the extreme condensation it exhibits,—extending even to the exclusion of many things which might properly have their places in its pages, and to the according of but a passing notice to others of importance. This has been caused by the necessities of the time used,—little more than four months having been occupied on the work, from the inception of the enterprise to its completion in its present form.

To those gentlemen who have so cordially and promptly aided them with materials for the work, the committee and the writer desire to present their grateful acknowledgments. Particularly are they indebted to Drs. A. L. Northrop and W. A. Bronson, of New York city, for their generous permission to Mr. Dexter to use their libraries, and for other facilities afforded by them; and to Drs. W. C. Barrett, of Buffalo, and J. W. White, C. N. Peirce, and T. L. Buckingham, of Philadelphia, for much valuable matter.

It is sincerely hoped that the work, the result of our combined efforts, will meet the approbation of the profession; to whom, individually and collectively, it is cordially dedicated by

THE AMERICAN ACADEMY OF DENTAL SCIENCE.

BOSTON, June, 1876.

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THE HISTORY
OF
AMERICAN DENTISTRY.

INTRODUCTION.

THE first appearance of Dentistry as a specialty of medicine occurs at a very remote period. Herodotus (500 B.C.), in narrating his travels through Egypt, then one of the greatest and most highly civilized nations of the world, the "mother of the arts and sciences," notices the division of medicine in that kingdom into special branches, and the existence of physicians, each of whom "applies himself to one disease only and not more. Some (physicians) are for the eyes, others for the head, others for the teeth, and others for internal disorders." * How far these physicians had advanced in the science of their profession is not known. It is probable, however, that their knowledge was limited, as well as their practice; the latter, indeed, being circumscribed by enforced adherence to certain remedies and formulas fixed by law, on pain of death for any transgression of the limits.

In the *art* of Dentistry, if we are to believe the various antiquaries and discoverers of modern times, the Egyptians were far advanced; for, as related by many, teeth *filled* with gold have been discovered in the mouths of mummies; and such teeth have even been deposited in home museums, where they now remain. A collection in Liverpool is said to contain, besides artificial teeth, "two teeth of sycamore wood set in gold." Accounts have also been received of the finding of gold-filled teeth in mummies from Thebes. These gold fillings, perhaps, will eventually prove to be merely *gilded wood;* for it is well known that the higher orders of Egyptians often caused the mummies of their deceased friends and relatives to be lavishly decorated with paint and gilding. Indeed, several instances of supposed Egyptian gold fillings have already, through the agency of a knife-blade, been proved to be mere gilding on the natural teeth.

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* Herodotus, II. 84.

The insertion of artificial teeth, however, has been long practiced. The Hindoos and Egyptians are the first recorded in this branch of dentistry. Belzoni and others have found artificial teeth of sycamore wood in ancient sarcophagi. The mode of fastening was by ligatures or bands of cord, or gold or silver wire, tying the substitute to its natural neighbors. The tenth of the celebrated (Greek) Laws of the Twelve Tables (relating to funeral ceremonies) has, among others, this direction: "Let no gold be used, but if any one has had his teeth fastened with gold, let it be lawful to bury or burn that gold with the body."

Ancient Greece is celebrated as having been the nursery of modern medicine. The medical schools of Cnidos, Cos, Rhodes, Cyrene, and Croton date from or about 500 or 400 B.C. These insured the progress of medical science, under tolerably liberal codes of laws, and aided by the then rapid growth of civilization.

Hippocrates) 500 B.C.), the "father of medicine," was also the first to enter deeply into the study of the teeth. His doctrines in this regard are now sufficiently familiar to the student. Aristotle wrote largely about 350 B.C. Heraclidus of Tarentum, Herophilus, and Erasistratus are recorded as *dental* operators (300 B.C.). The latter deposited in the temple of the Delphian Apollo a "leaden ondontogogue, which we should call a tooth-drawer" (forceps), . . . "to prove that (only) those teeth ought to be removed which are loose or relaxed, and for which a leaden instrument will suffice." *

The two latter are, we believe, the first recorded as having dissected the human cadaver. The Emperor Alexander, to whose court they were attached, delivered over to their tender mercies such criminals as were condemned to death. On the first of these occasions, the emperor and his whole court were present. The operation performed was the amputation of an arm; and because the man survived, many of the court fled in terror, believing him to be an immortal. Such being the extent of the knowledge then possessed by cultivated persons as to the effects of hurts on the body, we may in it find an indication of the probable amount of physiological knowledge of the physicians themselves.

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* C. Aurelinus.

Celsus lived about 100 B.C. He was the first to recommend the use of the file in the mouth; saying, that the points of a decayed tooth, which hurt the tongue, should be removed with an iron file.

Galen (A.D. 150) has treated the subject of the teeth more extensively than any other of the ancient authors. He taught that they were true bones, that they were formed in the fœtus, but did not become apparent until after birth, and even declared that the canine should be called eye teeth, because they received branches from that nerve which also supplies the eye.

Ætius (Arabian, A.D. 300) discovered the foramina in the roots through which the nerves and vessels enter. Albucasis, another Arabian physician (about 1100 A.D.), gave rules for the replacement of lost teeth by substitutes, both natural and of animal bone or ivory.

Some extracts from a curious and rare old work, by "Helkiah Crooke, Doctor in Physicke," published in London in 1618, will be of interest as slightly indicating the character and extent of the physiological knowledge of that time.

"That they (the teeth) are bones some men do deny, first, because bones are insensible, the teeth sensible. Secondly, because the bones have certaine limits of action or increase, neyther do they ever grow againe if they perish, but in teeth it is quite contrary. Thirdly, because they are harder than other bones. Fourthly, because bones exposed to the ayre do grow blacke, whereas the teeth do keepe their whitenesse. . . . Finally, say they, there is a stone that will consume fleshe, called therefore *Sarcophagus*, which within forty days will devour the whole body except the teeth. If therefore the teeth were of the nature of bones, they also would be consumed.

"They were made very hard that they might not weare so soone or be broken in the chawing or breaking of hard things, for they are not lined eyther with fatte or gristles as other ioynts are to hinder attrition. The teeth therefore do breake bones, resist the edge of steele, neyther can they easily as other parts of the body be burnt with fire. *Hippocrates* in his booke 'De Carnibus' ascribeth the cause of their hardnesse to the quality of the matter out of which they are ingendered, for hee writeth that out of the bones of the head and the iaws there is an increase of a glutinous matter. In that glutinous matter the fatty part falleth downe into the sockers of the gums where it is dryed and burnt with the heate, and so the teeth are made harder than other bones because there is no cold remaining in them."

With the later authors on this subject all may be supposed to be more or less acquainted. Indeed, the above have been mentioned less for information than to point out the inconsiderable germ and slow first growth of that which has since expanded into modern dentistry.

At the last part of the eighteenth century the anatomy and physiology of the teeth had become almost as accurately and completely demonstrated as it is at this day. A survey of the labors of scientists since Paré, Hunter, Fox, Bell, and Nasmyth will, it is believed, yield comparatively little of important discovery. It is true that the general scientific understanding of these subjects has become more correct and comprehensive. But the advance of theory has not been equally rapid with that of practical knowledge and attainments.

In the latter particulars there was then, certainly, a wide field for improvement; and no one need now be told that the field has been well utilized. A glance at the then condition of mechanical and operative dentistry will quickly reveal the measure of progress.

At the introduction of mineral teeth in France, about 1774–76, general dentistry used for its artificial substitutes elephant and hippopotamus ivory, and animal and extracted human teeth. The latter variety, although by very far the most durable and comely, and adapted with the greatest facility, was expensive and difficult to obtain in sufficient quantity, and also met with a general and natural prejudice against it on the part of the public; for it was said that diseases were liable to be introduced into the wearer's system by them.

Animal teeth (those of sheep and cattle, principally), although of a brilliant color, were not easy of adaptation to the human mouth; and, as one side was devoid of enamel,—the tooth becoming there rapidly corroded,—and as the pulp-cavities were so large that the crowns were soon worn through, this variety was also generally discarded, leaving the field clear to the elephant and hippopotamus ivory; which were sufficiently cheap and plentiful (especially the former), and easily carved and adapted.

The base, as well as the teeth, was then of ivory (there are accounts of *wooden* bases!), the teeth and base being generally carved from one block. Such operators as were unusually nice in their processes endeavored to obtain some exactness in adaptation, and submitted their work, from time to time, to the correction and guide of colored impressions of the surface it was intended to cover. But the great majority of operations were roughly performed, with little attention to correct fitting, or the exact position of the surrounding parts.

Such teeth and such plates could, of course, possess only slight permanence, both because of their great permeability to the fluids of the mouth and loss of substance from abrasion. Of the former objection Harris says, "They give to the air returned from the lungs an insufferably offensive odor, which cannot be corrected or prevented. They may be washed half a dozen times a day, and taken out and cleansed at night, but it will still be grossly perceptible; and, although it may be much worse in some mouths than in others, none who wear teeth formed from this substance are entirely free from it."*

Such of the operations of dentistry as it was imperatively necessary to perform were conducted by the medical and surgical practitioners, themselves few and residing mainly in the cities and larger towns, and wanting in almost all the knowledge now considered an absolute necessity to the dentist. Indeed, tooth-*drawing* was almost the only part of dentistry then practiced by physicians, and appears to have been the very general remedy for ailments of the teeth, no matter of what character. The key was, until quite a recent period, the principal instrument used, the punch and elevator being its adjuncts; and multitudinous were the operations performed by these,—operations which, at the present day, would be correctly styled "heroic surgery." Fractures of the alveolus, and even of the jaw, were not uncommon; and in such cases (when performed by dentists) the patient was remanded to nature or the family physician for treatment.

In October of the year 1766 there arrived in the United States from England Mr. John Woofendale. This gentleman was a (for that time) regularly educated dentist, having been instructed by Mr. Thomas Berdmore, dentist to George III. He is the first dentist, so called and practicing as such, of whom any record can be found as having visited this country.

Mr. Woofendale commenced practice in New York soon after he arrived. He also practiced in Philadelphia. But, either because he did not receive sufficient practical encouragement in his profession, or from some other and unexplained cause, he returned to England,—March, 1768. While here he had constructed an entire double set of artificial teeth for Mr. William Walton, of New York; which is believed to be the first recorded full set of teeth inserted in America. From the time when Mr. Woofendale returned to England until some years after the Declaration of Independence there was not, as far as can be discovered, a regularly practicing dentist in this country.

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* Dictionary of Dental Science, p. 67.

Such, in brief, was the general state of dentistry at the birth-time of our republic. When we look back to that condition of the science, we may and do experience a just feeling of pride, and perceive matter for gratulation in the giant strides of improvement made manifest by the slightest comparison of *then* and *now*. Such a retrospect is the best and surest means of encouragement to continue in the path by which we have so rapidly and agreeably advanced; and will ensure, it is certain, a further and equally great elevation of our profession among the liberal sciences in the future.

THE FOUNDERS OF AMERICAN DENTISTRY.

ALTHOUGH this work is not intended to be in any sense biographical, yet it seems proper to make some particular allusion to those dentists who were the pioneers of the profession in this country, and who laid, solidly and durably, the foundations of the present superstructure of dentistry. In treating of this subject, however, numerous difficulties have presented themselves, not the least of which is the (almost) impossibility of obtaining any reliable information about the *earliest* of American dentists. As to these, the details to be had are, at best, very meagre, and the accounts of them extremely conflicting. Another objection to be overcome is the possible charge of invidious selection of individuals for notice. In this regard we may say, that certain names have always stood so high on the dental roll of honor and priority that little risk can be incurred by accepting them at once as proper subjects for such a chapter as this; and we cannot, we think, be justly censured for limiting our biographical department strictly to those names; which will, accordingly, be done.

Prior to the war of 1775–83 there was, as far as can now be ascertained, only *one* dentist, practicing specially as such, in this country, and he remained here only a short time. This gentleman was Mr. Robert Woofendale, whose temporary sojourn here has been already noticed in the Introduction as fully as is now possible.

In the year 1776, and for *five* years thereafter, we have no authentic account of any dentist in this country; so that the date 1876, although representing the one hundredth year of existence of the nation, cannot be said to be, strictly, the centennial of American dentistry.

Most accounts have given, as the first dentists in America after 1776, Mr. Joseph Lemaire and one Whitelock, or Whitlock; but it appears from Watson's "Annals of Philadelphia" (vol. i. p. 179) that, on Mr. Lemaire's first appearance in that city, in 1784, he found there a dentist (whether native or foreign is not stated) by the name of Baker, "the first person ever known as a dentist in Philadelphia." This is also all that is known to-day of this person. When he first practiced in Philadelphia cannot be ascertained.

Joseph Lemaire was a French dentist, who came to this country with the French army. Dr. Hayden* mentions him as follows: "The first hints that were afforded or opportunities offered to any person to obtain a knowledge of the profession were, we believe, through a French dentist, by the name of Le Maire, who offered his services to the public during the Revolutionary war. . . . He was not without some pretensions to skill in practical operations, especially in transplanting teeth. . . . He likewise undertook to instruct some two or three persons in the profession, which may be considered as the origin or commencement of dentistry in this country." Dr. James Gardette also mentions Lemaire (called by him *Lemayeur*) as one who had the "reputation of an eminent dentist" in Philadelphia when he arrived in that city, in June, 1784.†

Dr. Hayden speaks (former citation) of *Whitelock* as a dentist, "a gentleman of polite address and accomplished manners," who, about the same time as Lemaire, or shortly after, entered this country as one of a company of theatrical performers who were induced to come here through "a rage for theatrical performances," which, it seems from this, was then prevalent with our ancestry.

From a notice in Harris's "Dental Dictionary,"‡ it appears that *Isaac Greenwood*, the father of that John Greenwood celebrated as having constructed artificial dentures for George Washington, was the first dentist in Boston. From this notice, no dates being given in it, we are forced to conclude that the dental practice of the father was anterior to that of the son, who began, as nearly as can be ascertained, about 1784–5. Another vague notice in the same work (p. 334) gives us to understand that *Clark Greenwood*, a younger brother of John, was in practice in New York at and before that date.

We have now named all the dental practitioners of the earliest dates, information of which is so scanty and unreliable as to warrant only the conclusion that they were, if not the first, at least among the first of the profession in this country. The primary appearance of any of them it is impossible now to ascertain. It is probable that some, if not all, of them may antedate those of whom we have reliable facts and data to offer; therefore they have been placed first in our notation. The next to be mentioned are those of whom exactness in date and correctness of knowledge can be asserted.

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* American Journal of Dental Science, 1st Series, vol. ii. p. 20.

† Ibid., vol. x. p. 65

‡ Edition of 1849, p. 333.

The first of these, in the order of time, was *Josiah Flagg*, who, as far as can now be accurately determined, was also the first dentist native to this country. He held a major's commission in the American army, and commenced practice as an itinerant immediately after the close of the war, in 1782. He had obtained his knowledge of dentistry from that Lemaire already mentioned, who was then in the army of Count Rochambeau, and who taught young Flagg (he was only eighteen years of age) while the French and Americans were in winter quarters, side by side, near Providence, Rhode Island, 1781–82. Later he settled in Boston. During the war of 1812 he was taken as a prisoner to England, where, while on parole, he made the acquaintance of Sir Astley Cooper, and assisted him in operations at Guy's Hospital.

The following extract from a circular which Flagg was wont to distribute in the various towns in which he stopped during his itinerant practice will be interesting. It is without date, but was probably printed somewhere from 1785 to 1790.

"Dr. Flagg transplants teeth; cures ulcers and eases them from pain without drawing; fastens those that are loose; mends teeth with foil or gold to be as lasting and useful as the sound teeth, and *without pain in the operation;* makes artificial teeth, and secures them in an *independent, lasting, and serviceable manner*. Sews up harelips, and fixes gold roofs and palates, greatly assisting the pronunciation and the swallow. . . . Cuts the defect from teeth and restores them to whiteness and soundness, without saws, files, acids, and such abusives as have shamefully crept into the profession, and which have destroyed the confidence of the publick. Sells, by wholesale and retail, dentifrices, tinctures, chewsticks, masticks, teeth- and gum-brushes, suitable for every age, complaint, and climate, with directions for their use."

If the date we have given as probably correct for this circular be really so, then the recorded use of gold for filling in this country is earlier than has been heretofore known. There is another (and dated 1796) circular of Dr. Josiah Flagg's in existence, fuller and more complete than that just quoted. It will be noticed further on in connection with other divisions of this work. Dr. Flagg died in Boston in 1816.

James Gardette was born in France, 1756. He studied medicine for two years in Paris (1773–1775), and was also, immediately afterward, nearly the same length of time in hospital practice at Toulon, when he was commissioned a surgeon in the French navy. He arrived at Plymouth, Mass., in January, 1778. He subsequently resigned his commission, and adopted this country as his home. When the French fleet and army, under Count Rochambeau, arrived at Newport (1781) he visited that town and found occasion for some dental practice among the officers. In the autumn of 1783 he went to New York, where his professional success appears to have been slight. In 1784 he removed to Philadelphia, where he continued in a very successful dental practice until 1829, a period of forty-five years.

Mr. Gardette's name will always be prominent among those of the best American dentists. "As an operator Mr. Gardette displayed great judgment, care, and dexterity."* He was the first to substitute flat clasps for ligatures or wires in artificial work. He invented the "mortise plate" "to which the teeth are secured by means of gold pins, and which permits the tooth to rest upon the gum instead of the gold plate."† The first application of the principle of suction or atmospheric pressure has been attributed to him. It is probable that the idea was first advanced by him; but the principle was subsequently improved upon by the employment of the cavity plate many years after. "He was the early advocate, if not the first who recognized the wisdom of affording space for the healthy and good arrangement of the teeth by judicious extractions in youth."‡ He was also one of the first dentists who substituted gold foil for lead in filling teeth, and "related that he had at one period prepared gold foil for his own use from Dutch ducats,§ when no sufficiently skilled gold-beater could be had. He published, so far as is known, only one article. This, "On the Transplantation of the Human Teeth," may be found republished from the Philadelphia *Medical Recorder* in the *American Journal of Dental Science*, 1st Series, vol. x. p. 64. In 1829 he returned to France, and died at Bordeaux, August, 1831.

John Greenwood enlisted at the early age of fifteen in the American army, and was in the battles of Bunker's Hill and Trenton, and also in an expedition to Canada under Arnold. He afterward entered the naval privateer service, in which he remained until the close of the war; when, finding himself without employment, he applied to his "youngest brother, Clark Greenwood, who was in New York practicing dentistry,"|| but received no encouragement from him. He then embarked in the business of nautical and mathematical

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* Harris's Dental Dictionary, p. 316.

† Ibid.

‡ Ibid.

§ Ibid.

|| Ibid., p. 334.

instrument making. "Soon after having engaged in this new business, Dr. Gamage requested Mr. Greenwood to extract a tooth for one of his patients, which he accomplished very successfully. This was the commencement of his practice as a dentist. He was, however, for some time after this employed in the manufacture of nautical and mathematical instruments and ivory turning, and practiced dentistry as opportunity offered. The demand for his services, however, in the last-mentioned capacity, soon increased to such an extent that he was compelled to abandon his other occupations and to procure the assistance, first, of William Pitt, and afterwards of Clark Greenwood, his brothers, to enable him to meet his numerous professional engagements. . . . . Mr. Greenwood was . . . . well informed in the surgical department of his profession. . . . . During his practice in the treatment of a diseased maxillary sinus, he perforated this cavity from the socket of an upper molar tooth, and effected a cure. . . . . It has been said that he was the first to strike up a gold plate to serve as a base for artificial teeth in the United States, ... without a knowledge of its ever having been done before that time, 1799."* He also constructed sets of artificial teeth with stained gums in hippopotamus.

But Mr. Greenwood is best known to the profession of to-day through the fact of his having been the dentist of the first President, George Washington. He constructed several sets of teeth for that eminent man, one, at least, of which is now in existence, in the possession of Dr. John Allen, of New York; and wore as a watch-charm the general's last natural tooth. Below is a letter written him by General Washington:

"*Mount Vernon, January 6th*, 1795.

"*Sir—Your letter of the 28th ult., with the parcel that accompanied it, came safe to hand. I feel obliged to you for your attention to my request and for the directions you have given me.*

"*Enclosed you will find bank notes for fifteen dollars, which I shall be glad to hear have got safe to your hands. If you should return to Connecticut, I should be glad to be advised of it, and to what place, as I shall always prefer your services to those of any other in the line of your present profession.*

"*I am, sir,*
"*Your very humble servant,*
"G. WASHINGTON."

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* Harris's Dental Dictionary, p. 334.

Horace H. Hayden was born the 13th October, 1768, and at the age of fourteen went to sea as a cabin-boy, voyaging to the West Indies. Two years later, being thrown upon his own resources by the poverty of his parents, he became apprentice to an architect, which business he followed until his twenty-fourth year; when, being in New York, and having occasion for the professional aid of a dentist, he visited Mr. Greenwood. While under treatment, he determined to become a dentist; and, "procuring the few dental books which were then accessible, and not apprehending any deficiency in mechanical skill, he directed his course southward in quest of a location,"* and arrived in Baltimore in 1804, where he determined to remain.

Dr. Hayden's previous education was hardly calculated to further his professional projects; but, being a man of considerable energy and native ability, he, by dint of hard study, soon mastered his textbooks, and thereupon began to gain some local reputation. He afterward conceived the idea that the dental profession was capable of a much higher public and scientific status than it then held; which elevation, he rightly considered, could be reached only through a higher standard of scientific attainments. Accordingly, he began the study of general medicine, while continuing to operate as a dentist; and with such effect that, later in his life, he received honorary degrees from both the University of Maryland and the Jefferson College of Philadelphia. In 1825 he was invited by the former institution to read a course of lectures on dentistry before its medical class. He also devoted much attention to the study of geology, and wrote a work on that science.

For the furtherance of his ideas on dental education and standing, he joined (1839) with those gentlemen who petitioned the Legislature of Maryland to establish a dental college; "the faculty to consist partly of dental and partly of medical practitioners;" and, that institution having been finally established in Baltimore, he, at the advanced age of seventy, assumed the duties of its chair of dental physiology and pathology.

Dr. Hayden was also one of the founders of the American Society of Dental Surgeons, and was elected (1840) its first president; which office he continued uninterruptedly to hold until the time of his decease, January 26th, 1844.

Besides his work on geology, already noticed, Dr. Hayden wrote many papers on dentistry and medicine, which were published in the medical periodicals of the time. He was a man of unusual energy and strength of character. The eminence to which he attained, in the medical as well as the dental profession, proves this; for such eminence was entirely the result of his own untiring and almost unaided efforts, without any regular education in these directions.

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* Harris's Dental Dictionary, p. 338.

Edward Hudson was born in Ireland in the year 1772. Harris remarks that "His parents, it is believed, were members of the religious Society of Friends, and although left an orphan at an early age, the principles implanted in his mind by his connection with this proverbially honest and upright sect appeared to germinate, and in maturer years to produce appropriate fruit."*

Upon the death of Hudson's parents, a cousin, who was established in Dublin as one of the most prominent dentists of that city, adopted young Edward as his son, and soon after entered him as a student at Trinity College, where he prosecuted his studies with such ardor and success as delighted his benefactor, who was a man of great attainments. Hudson pursued the practice of dental surgery in the office of his relative, and "rose rapidly in qualification for his chosen profession, in which his future eminence was then confidently predicted."

While at college Hudson was a member of several of the debating and other societies established about that time (1795), and soon became prominent in these connections. Here he knew and was intimate with many of the most distinguished men of the day and country,—among them the Emmets, the Sheares, the Corbetts, and Moore, the poet. With the latter he was especially familiar, and the friendship then formed between them ceased only with life.

The societies of which he was a member at length became so open and liberal in their treatment of those political and social questions which were then agitating all Ireland and threatened disastrous consequences, that the lord chancellor, Clare, dissolved them, and ordered the banishment of such of their members as were most obnoxious, from their pronounced views, to the government. Hudson at this time escaped the hand of authority; but immediately compromised himself still further by joining the Society of United Irishmen,—an association so distasteful and dangerous to the home government that the greatest vigor and relentless severity were manifested by it in the pursuit and punishment of the members. With many others,

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* Harris's Dental Dictionary, p. 369.

Hudson was seized, and imprisoned in Fort George, Scotland; where he remained until the peace of Amiens, in 1802. After being released he came to America.

He began the practice of dentistry in Philadelphia in 1805. At that date Mr. James Gardette was the only dentist of repute in that city, and had attained a very high reputation. Hudson's professional progress was, at first, slow; part of his thoughts and time being engrossed with some business enterprises in which he had engaged. But these ended disastrously, leaving a burden of debt; from which, on a percentage being paid them, the creditors gave a full release of the remaining amount. It is characteristic of Hudson that he, in spite of this release, eventually paid, from the income of his professional practice, all that part of the original indebtedness, with interest, for which he had received the release.

Once freed from the shackles of commercial pursuits, Hudson soon attained great eminence in his profession. The peculiar kindness, honesty, and uprightness of his nature gained him hosts of social friends; and his skill as a practitioner drew to him so many and such patients that he acquired a competence. Harris (former citation) says that "by his patients he was idolized as few of his professional brethren can ever expect to be."

Hudson's standard of excellence in dentistry was not only high, but for the time somewhat novel. Parmly (E.) says of him, "We are probably more indebted to his success than to that of any other man for the importance which was attached at that period to operations which were intended to *preserve* the natural teeth in their natural state." For, "by the complete success attending the practice of this great man, the public were soon convinced that teeth could be saved" —instead of being extracted. "The surgical department, embracing all required operations on the living teeth, ... was as well understood, and as perfectly and thoroughly practiced by Hudson . . . . as by any operators who ever lived, either before or since that period."*

John Randall was born in 1773, and graduated at Harvard in the class of 1802, a class celebrated for the since-displayed eminent talent of many of its members. He studied medicine with Dr. John Jeffries, of Boston, and commenced medical and dental practice in that city in 1805.

The circumstances under which he was led to turn his attention to dentistry are interesting as showing the character of the general dental practice of the time. Finding, while at college, his teeth decaying, Randall applied to the most prominent dentist of whom he knew; and was frankly told by that practitioner that "his business was to put in *new* teeth," and that he declined operating to preserve the natural ones. This, in the light of his general education, appeared to Randall to be a very limited view of dental surgery; and he at once procured such dental works as he could, and studied them under the impression that disease might and should be remedied without the removal of the diseased member. His first efforts in dentistry were while he was in college, and performed on himself. His fellow-students also were benefited by his operations.

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* American Journal of Dental Science, 1st Series, vol. iii. p. 8.

Dr. Randall gave, for many years, only a portion of his attention to dentistry, for he considered medicine his calling. He never advertised either branch of his profession,—although such a method of obtaining publicity was resorted to by the most eminent of his contemporaries, without any thought of its being unprofessional. "He was decidedly conservative in his theory and practice of dental surgery. . . . He was eminently popular and successful in extracting teeth. He used the key with great skill, and the forceps long before they were known as an article of merchandise. . . . His success in engrafting (pivoting) teeth was very great."* He died in 1843, having long been a useful and honorable member of society.

Leonard Koecker was born in Bremen, Hanover, in 1785, and early in life engaged in mercantile pursuits. At this time he became acquainted with a traveling Jew dentist, who took much notice of him, allowing the lad to handle his instruments, and even presenting him with a small set, which Koecker preserved. He came to this country as a commercial agent, but failed; and, about 1807, began the practice of dentistry in Philadelphia, without any knowledge of the profession. But his native ability and energy remedied any defects in that direction. He practiced in Philadelphia until 1822, his reputation rapidly increasing. Indeed, at that date, his professional income was eight thousand dollars per annum, then a much more important sum than now.† His health, however, compelled a voyage to Europe; and he eventually settled in London, as a dentist, and remained there until his death in 1850, in very extensive and widely-known professional practice.

As has been seen, Koecker had, in the beginning, absolutely no dental knowledge. His first case in Philadelphia, one of simple extraction, occasioned him much mental embarrassment. But, to use the words of Parmly, "He grasped the tooth with an instrument, shut his eyes, and turning his head from the patient, made a strong effort which dislodged the tooth," — he being, meanwhile, "under such excitement that he knew not whether the tooth was out or the jaw broken."* The patient, however, appears to have been quite satisfied; for Parmly adds that he assured the trembling operator he "had never before had a tooth extracted so easily," and that "from that gentleman's influence his (Koecker's) success commenced."

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* Harris's Dental Dictionary, p. 638.

† American Journal of Dental Science, 2d Series, vol. i. p. 470.

From being at first in great need of a teacher for himself, Koecker finally came to be a teacher of others. His work on Dental Surgery, published in London in 1826, is one of very considerable merit, and even now a standard of reference. Some of his methods of operating, particularly in the treatment of the dental pulp, have been almost universally adopted by the highest authorities. His subsequent professional attainments, when considered side by side with his "first case" in the house in Sansom Street, Philadelphia, will certainly warrant us in applauding the care, energy, and conscientiousness displayed in his whole career, and the bestowing on him much honor and respect.

We have now noticed, briefly, such dental practitioners as seem indisputably entitled to treatment under the present head. Many more gentlemen, of later date but not less strong claims to notice, might be here included; but we prefer to allow their acts to speak for them, as embodied in the pages to come, rather than to mention them specially. In thus deciding, no negligence of their claims, or depreciation of their abilities, is intended or can be charged.

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* American Journal of Dental Science, 2d Series, vol. i. p. 470.

MECHANICAL DENTISTRY.

ARTIFICIAL TEETH.

ARTIFICIAL TEETH OTHER THAN PORCELAIN.

Before the use of porcelain teeth became general in dentistry, various materials and methods were in vogue as substitutes for lost or decayed teeth. The following are the principal materials used, named in the order of estimation in which they were held:

Human teeth.
Animal teeth (those of cattle and sheep).
Hippopotamus tusks and teeth.
Elephant, and other ivories.
Bone.

The methods of use of these will be described in the order given.

Human Teeth.—In earlier years, a very common method of using these teeth was by transplantation; but, belonging, as it does, more to operative than to mechanical dentistry, this mode will receive notice under the former head.

The part of the human tooth used by dentists, except in transplantation, was that portion which is covered with enamel. A lost tooth was replaced by one of its own class, as incisors by incisors, and molars by molars. In the better class of operations, attention was paid to matching the natural and introduced teeth in such particulars as shape, size, color, and quality.*

The methods of introduction were four, viz., pivoting, by ligatures, with springs, and on bases. The first, where a healthy and proper root rendered it practicable, was deemed by far the best method. Robert Woofendale, in 1783, says, in regard to this operation, "Another method of supplying the loss of teeth by art is, by fixing the crown or enameled part of a sound human tooth to the root of a tooth of which the enameled part is wholly, or in part, decayed or broken. This is done by filing each properly, and uniting them by the assistance of a screw of gold or silver; and which may be done so completely, that it is sometimes not without difficulty they can be separated, in some instances for several years, provided the orifice in the root of the tooth, through which the nerve passes, is not much decayed. This operation can only be performed where the teeth have but one root; neither can it be practiced when the root of a tooth is out." *

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* Fitch's Dental Surgery, 1829.

Benjamin James (1814) says, "Dentists pursue very different methods of fastening the new crown upon the roots; some drive the wire, which is attached to the crown, into the canal of the root, with cotton wrapped around it to make it tight; while others previously place a piece of wood in the root, and attach the crown to this substance. As the cotton, of the former method, absorbs and retains the saliva, which, from stagnation, becomes offensive; and as teeth, set in this way, are sooner loosened, we are induced to prefer the latter manner of setting them." † The mode preferred by Mr. James was simply, screwing part of a gold or wood pivot into the crown, and driving the other part (previously squared on its sides) into the wood socket already perforated for its reception and placed in the root.

Human teeth were also fastened in the mouth by tying them by ligatures of gold or silver wire, silk, unbleached thread, sea grass (Indian weed), or silkworm gut. This is the oldest known method of fixing artificial teeth in their places. This mode, however, was open to so many objections that it was rarely used by the more skillful operators, and then only where no other mode was possible; and it gradually fell into almost entire disuse on the appearance of gold or other plates fitted with clasps.

Human teeth were scarce, and very costly. In an advertisement inserted in a Philadelphia paper in 1784, M. Le Mayeur, a dentist, offers *two guineas* each for sound teeth to be obtained from "persons disposed to sell their front teeth, or any of them."‡ This may, at present, appear almost barbarous; but it is nevertheless certain that poor persons often disposed of their teeth to dentists in the same manner in which destitute females have since sold their hair, in moments of necessity, to the hair merchant.

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* Practical Observations on the Human Teeth, by R. Woofendale, London, 1783.

† A Treatise on the Management of the Teeth, by Benjamin James, M.M.S.S., Boston, 1814.

‡ Watson's Annals of Philadelphia, vol. i. p. 179.

There was, also, some prejudice against human teeth on the ground that they were often the vehicles for introducing diseases into the system of the wearer.

These objections rendered necessary, in many cases, the employment of some material which should be cheaper, and not open to the other objections against human teeth.

Animal Teeth.—These were largely used, the teeth of cattle the most so. They were fastened in the mouth by the same means as human teeth. Their color, however, was generally much lighter than that of the natural teeth; and, although they possessed, on one surface only, a firm and durable enamel, the other surfaces were therefore exposed to the attacks of corrosive agents in the saliva, and were easily destroyed. Also, their pulp-chambers were very large, in proportion to the tooth, and were often cut into in fitting, or broken into during mastication. Their peculiar forms were also a great obstacle to correct fitting or adaptation in the mouth. On these accounts they often gave place to—

Hippopotamus Ivory.—This material was, perhaps, more extensively used than any other of the dental substitutes. In cases where two or more consecutive teeth were inserted, it was (except where ligatures were introduced) almost the only material in use, either as carved in a block into the semblance of the removed teeth, or as a base on which to secure human or animal teeth, either in the absence or presence of roots. In the former case, a correct fitting of the base to the remaining natural teeth was often the only mode of attachment; while in other cases, the block of teeth or the base was secured by ligatures to the adjacent sound teeth. But the mode used wherever practicable, and considered as most reliable, was pivoting. This, as mentioned above, was done in the introduction of a single tooth; but it was also done in cases of partial or even whole dentures, two or more dowels, according to the number and position of available roots, being fastened in the block.

The block, or single carved tooth, often comprised a portion of *gum* carved in the material as a base, the teeth and gum being in one piece. Much nicety of adaptation was sometimes evinced in this process, and the shapes of the various teeth were accurately copied. Partial dentures, with gums, were carved from one piece of hippopotamus ivory, with vacancies or holes for the admission of the remaining natural teeth, the whole so artistically worked as, but for the material, to almost preclude the possibility of detection when in use.

The carved gums were often colored to represent the natural gum; but it was not possible to make this color durable. Woofendale says, "This deception looks very well at first, but I never stained any myself, or saw any stained by others, but that the color was discharged in a short time."*

Elephant Ivory, and Bone, were used for the cheaper grades of operations, but the higher classes of operators generally repudiated them. "Teeth made of *ivory* (the tusk of the elephant), or of *bone,* are very imperfect: they have no enamel, are soft, soon become discolored and begin to decay, and unavoidably render the breath offensive."† "When artificial teeth are made of common *bone,* or *ivory,* they generally soon turn yellow."‡ "This material (ivory) possesses more objection than any other animal matter used for the purpose; it is porous, readily absorbs the saliva, and becomes decomposed in a very short time, by which it is discolored, and rendered highly offensive to the patient."§ At the date of this extract, however, ivory and bone were not in use in this country, although they are still so, to a limited extent, in some parts of Europe.

Serious and various as were the objections to teeth of animal substances, they held their place in the profession long after the introduction of mineral teeth. In fact, human teeth were used as substitutes, especially in the regions remote from the more populous centres, until a comparatively recent period. This was owing, perhaps, as much to the conservatism of the profession (a conservatism very marked up to 1845) as to the inferior quality of the primary productions in mineral teeth. The lack of professional communion, and the strict secrecy very generally maintained in regard to processes and materials, were almost insurmountable barriers to innovation. But these barriers, once broken, vanished in the light of a newer and more liberal dispensation; and with them vanished human substitutes, with "sea-horse," ivory, and bone.

PORCELAIN TEETH.

Porcelain, or mineral teeth, though used in France as early as 1774, were not introduced into this country until 1817, when Dr. A. A. Plantou arrived in Philadelphia from Paris, and engaged in the practice of dentistry. The teeth then made in France, and brought here by Dr. Plantou, were of such form, color, and materials as would now be regarded with contempt. The front teeth were, in shape, almost exactly like a *split bean*, the labial surface being rounded and enameled, the palatal perfectly flat. Lengthwise across this flat back was formed, before baking, a half-round groove, in each side of which were inserted small pieces of platinum. This groove was for the introduction of a gold wire, around which the platina points were hammered, and solder flowed on the metals, thus securing the wire to the tooth.

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* Woofendale on the Teeth, 1783.

† The Family Dentist, by Josiah F. Flagg, Boston, 1822.

‡ Woofendale on the Teeth, 1783.

§ Surgical and Mechanical Dentistry, by S. C. Harbert, Philadelphia, 1847.

These teeth were coarsely made, and without gums; being designed for adaptation to ivory or bone bases. They were white, opaque, and brittle. "The mineral or china teeth are very imperfect; they have an opaque, earthy appearance, are brittle, and the sensation they produce when brought in contact with the natural teeth, in mastication, is very disagreeable."*

The question of priority in the manufacture of mineral teeth in this country is one quite easily settled. Claims are made for Dr. A. A. Plantou and Charles W. Peale, of Philadelphia, and Dr. Henry Villers, of Boston. Mr. Peale, however, in his own autobiography, states that he was induced to experiment in porcelain teeth through the failure of a set made for him by Dr. Plantou. Hence we may say that the honor of first manufacturing mineral teeth lies between Drs. Plantou and Villers.

The date of Dr. Plantou's first attempts cannot be determined more closely than by giving the time as about 1819 or 1820. However, it is certain that in 1822 he exhibited his mineral teeth before the Medical Society of Philadelphia, and received for them a certificate of approbation. The latter date being certainly correct, it is very probable that the first of the former ones is also to be relied on, not only as a consequent inference, but from information.

Dr. Villers's claims to the introduction of the manufacture of porcelain teeth in this country are based principally on a communication of his to the New York *Dental Recorder*, published in vol. viii. p. 203; in which he states that he first experimented in England (before 1819), where he succeeded well, and returned to Boston in 1819, where he gave instructions and sold recipes to many prominent dentists, among others Drs. J. F. Flagg, Keep, Harwood, and Tucker. An extract from the letter cited will serve to show the nature of his claims:

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* The Family Dentist, by Josiah F. Flagg, Boston, 1822.

"Dr. E. Parmly can bear witness, I believe, as to my being the first to make teeth with a translucent body, with parti-colors, to imitate the natural shades. Coloring matters were the most difficult to obtain; at that time titanium was scarcely known, and as a substitute I used antimony and iron, and occasionally silver, but at a white heat this would turn light-brown; to make the dark shades I worked in clinker from the forge. Dr. A. A. Plantou, of Philadelphia, was a personal acquaintance, and presented me with a certificate to the effect that I was the first to make translucent mineral teeth. M. Chemant* was the first to make full sets of terra-metallic teeth, which he told me were made of *vanvres* (fire-brick) glazed with window-glass, and when light shades were wanted he added pipe-clay and white sand. Drs. Maury, Fonzi, Fauchard, and Delefons, all living in London, expressed a favorable opinion of my teeth, and said I might expect to make a fortune by furnishing teeth for the dental profession. Dr. H. H. Hayden, of Baltimore, received instructions from me."

A careful examination of the above will show that no *dates* are given of the teachings and occurrences mentioned by the writer, although it is evidently intended to be *inferred* that some, at least, of those occurrences antedate Dr. Plantou. Further than this, however, we have the direct statement of Dr. Joshua Tucker† that Dr. Villers never so instructed him or Drs. Keep and Harwood, as claimed. And it is impossible, in any event, that Dr. Villers could have done so before 1830, for Dr. N. C. Keep commenced his dental practice between 1825 and 1830, Dr. D. Harwood began in 1832, and Dr. J. Tucker commenced dentistry in Boston in 1833.

From these facts, as stated, we can do no less than refuse to accept Villers's claims to priority in the manufacture of porcelain teeth in this country, for no reliable data are furnished to substantiate them. To Dr. A. A. Plantou, therefore, must be accorded the credit of initiating here an art which has since attained to almost gigantic proportions.

It is almost equally exactly determined that Mr. Charles W. Peale was the next after Plantou to manufacture mineral teeth. Indeed, he was near enough to priority to have had that place claimed for him.‡

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* M. Dubois de Chemant, who claimed and was granted patents for the first invention of mineral teeth.

† Communication to the author.

‡ By Rembrandt Peale, his son, at the First Annual Commencement of the Philadelphia Dental College, Feb. 28th, 1858.—*Dental News Letter*, vol. vi. p. 189.

Mr. Peale was a universal genius. He was successively a saddler, silversmith, watchmaker, dentist, and portrait painter, in which latter vocation he acquired his most enduring reputation. He was public spirited, and given to scientific research. The celebrated museum which bore his name was founded in 1785. He was one of the founders of the Academy of Fine Arts in Philadelphia.

His first teeth (about 1822) were made with holes through them for riveting to the plates, as he had been accustomed to do with teeth of animal substances. But these proving inefficient, he placed platinum wire in the composition before firing it.*

The next principal experimenter was Samuel W. Stockton, who commenced his experiments in 1825.

About this time porcelain teeth began to command attention among dentists, and many of the profession made them for employment in their own practice. It would be useless, and indeed impossible, to enumerate all who were thus engaged. Some arrived at, perhaps, greater celebrity than others, and among these we may name Joseph E. McIllhenny, of Philadelphia (1826); D. C. Ambler, of New York, and J. R. Spooner, of Montreal, Canada (1828); J. F. Flagg, of Boston (1830); Shearjashub Spooner, of New York (1831); Daniel Harwood and Joshua Tucker, of Boston (1833–4); James Alcock, of New York, and John Allen, of Cincinnati (1835); and last (though not least), Elias Wildman, of Philadelphia, who began his experiments in 1837.

In 1838, Dr. Shearjashub Spooner published in New York his work on porcelain teeth,† in which he gives the recipes of many of the then best known manufacturers, and several of his own.

It will be of value to here introduce some recipes showing the gradual advance in the composition of porcelain teeth from the time of M. Audibran, in France (1820), to that of Dr. Spooner (1838).

RECIPE OF M. AUDIBRAN.

Body.

Kaolin	6 oz.
‡Clay	1 oz. 4 dr.
Titanium	1 scr. 4 gr.
Oxide Gold	⅛ gr.
Filings of Platinum	2 gr.

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* MSS. of Dr. J. W. White.

† An Essay on the Art of the Manufacture of Mineral, Porcelain, or Incorruptible Teeth, by Shearjashub Spooner, M.D., New York, 1838.

‡ The clay used in this recipe is the *earth of Vanvres*, so called from the place where it is obtained near Paris.

Enamel.

Feldspar	7 oz.
Kaolin	8 dr.
Titanium	1 scr. 14 gr.
Oxide gold	⅛ gr.

The next recipe is described by Dr. Spooner,* as "the old body" of Mr. Stockton, of Philadelphia:

Body.

Spar	20 parts.
Silex	20 "
Sugar-house clay	10 "

Enamel.

Spar	20 parts.
Silex	2 "
Kaolin	1 "

Dr. Spooner remarks that "Mr. Stockton's present recipes are very different from his old ones."

Next is one of Dr. Henry Villers's recipes, which he spoke of as producing "magnificent" teeth:

Glass-house sand	24 parts.
Pearlash	8 "
Nitre	2 "
Borax	1 "

Dr. Spooner mentions Dr. Villers† as "one of the first to introduce the art of manufacturing mineral teeth into this country."

The next, and last, is one of Dr. Spooner's, which, he says, "fuses into a dense body that stands the fire well, of considerable translucency. Very good teeth may be made from this body."‡

Spar	20 parts.
Silex	5 "
Kaolin	1 "
Glass of borax	1 "

Samuel W. Stockton, who, as previously stated, began his experiments in 1825, was the first in this country whose manufacture of porcelain teeth attained to any commercial importance. Most of those who manufactured previous to 1835, did so to supply their own needs, but Stockton endeavored to supply the profession. About 1830 his teeth became pretty well and widely known, and soon thereafter were accepted and used as the best then procurable. The greatest obstacle to his absolute success lay in the uneven quality of his fabrication, for he did not work by unvarying formulæ, and often produced the most perfect of his teeth by sheer accident. One "batch," in particular, is still remembered by many as far above his average production.

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* Loc. cit., p. 84.

† Loc. cit., p. 72.

‡ Loc. cit., p. 63.

Stockton's manufacture was, as late as 1845, the most extensive in the country. His greatest production per annum probably amounted to five hundred thousand teeth; which were, however (although the best then to be obtained), what would now be called quite crude. His bodies were opaque, and uniform in color throughout their whole extent; the gum enamel was a smooth paint, applied on the surface before final vitrifaction of the tooth; the grinding surfaces of the bicuspids and molars were formed by a three-sided file, in single or crossed grooves; each tooth was of uniform thickness from side to side, no attempt being made to preserve an unbroken lingual surface in entire dentures by shading the thin incisors into the broad molars through a gradual thickening of the intermediate teeth. His stock was kept in bulk, in bottles; the modern method of sorting and fastening on cards not having been then introduced. In all these particulars, however, he was not a whit behind his contemporaries, but, on the contrary, gained several premiums in competition with them.

James Alcock, of New York, beginning in 1835, persevered in his endeavors to secure the strength and life-like appearance desired, until he produced very excellent teeth. His business in them became quite extensive; and remained so for many years. D. C. Ambler, also, having commenced his experiments before Alcock (1828), was quite successful in establishing his manufactures on a firm basis before the public.

Dr. Elias Wildman, of Philadelphia, began his experiments in 1837. He produced such results in life-like appearance as had not been obtained before, and remain unexcelled to the present time. His principal success was in the production of uniformity in gum enamel; in this particular he far outstripped all his rivals. To him must be accorded the honor of first reducing the manufacture of porcelain teeth to a scientific basis.

In 1844, Samuel S. White, a nephew of Stockton (with whom he had served a seven-years' apprenticeship in "the art and mystery of dentistry and the manufacture of incorruptible teeth"), began the production of these teeth, in a small way, in the garret of a dwelling-house at Seventh and Race Streets, in Philadelphia. This was the initiatory step in an enterprise which has since become the largest of its kind in the world.

The improvements in mineral teeth with which Mr. White stands credited are numerous and important. Among them may be numbered various changes in the forms of platinum pins; such as the bell-shaped termination, introduced in 1850; the double-headed pin, in 1863; and the foot-shaped pin, in 1872. Other not less important advances are: superior resistance to high temperatures in soldering; the maximum of strength as tested by riveting, as well as by practical use, with the minimum of bulk and weight; and improvements in texture, color, translucency, and vital appearance generally; together with closer imitation of the physiological and anatomical differences in the natural teeth than had before been attained.

So well known are his productions, however, that it will be superfluous to further trace the advance, either of his business or his manufactures; suffice it to say that he now makes, annually, over *four millions* of teeth, about two-thirds of the whole number used in the world.

BASE PLATES.

Ivory and Bone.—Previous to the introduction of metallic bases, the use of bone or ivory for this purpose was universal. The objections to these materials were numerous and important, being mainly identical with those advanced against teeth of the same substances; with the addition of great difficulty in securing correct adaptation to the mouth, and the impossibility of making a reasonably correct fitting permanent, on account of the loss of substance occasioned by the rapid decay of the material. In spite of these disadvantages, however, bone and ivory combined the greatest number of desirable points then attainable in any one substance; and their use was continued (though gradually decreasing) until several years after the first employment of metal for the purpose.

Ivory and bone, when used in the insertion of single teeth, or partial dentures on one side, were formed into what were called *sockets;* which covered only the gum from which the natural teeth were absent. When used in the case of a whole denture, the name *base* or *block* was given to the work. The manner of fitting was the same in both cases, and cannot be better described, in its best form, than by an extract from Robinson.*

"The surface of the model, having been previously prepared with wax and resin,† is now painted over with rose-pink and oil, and the block (of ivory) being applied horizontally, a portion of the coloring-matter adheres to the bone at the points of apposition, and thus indicates the parts to be removed by sculpers. . . . The process of removal or excavation must be continued . . . . until . . . . the bone comes in close contact with every . . . . inequality of the surface. A similar adaptation must also be made on a second model reserved for the purpose, the first having lost its sharpness from repeated applications of the bone. . . . At this stage . . . . it is necessary that the piece should be fitted to the mouth. For this purpose, first paint with rose-pink and oil the surface of the gum over which the piece is to extend; . . . . adapting the opposing teeth in the other jaw to the bite, by applying the coloring-matter also to their cutting-edges or grinding surfaces; and removing those marks on the bone which result . . . ."

These bases, thus formed, were fitted with teeth, either human, animal, or porcelain. It will be evident that only the greatest care, skill, and experience could produce results in this manner which would possess much accuracy of adaptation, or secure ease and comfort to the wearer; and when we add to these the objections already enumerated as applying to ivory teeth in the mouth, we cannot wonder that the profession and the public hailed with delight the advent of metallic bases.

Gold.—The date of introduction of metal bases into general dentistry cannot be exactly determined. It is generally supposed, however, that gold was the metal first used as a base for artificial teeth. It probably soon obtained, and has certainly ever since held, the most eminent position among the many materials for that purpose. It is probable that Dr. James Gardette, of Philadelphia, was the first who used the gold base in this country. Dr. Gardette arrived in Philadelphia from New York in 1784, and was for many years thereafter one of the most prominent dental operators in America. He used gold as a plate, certainly in the year 1787,‡ and very probably for some time before.

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* The Surgical, Mechanical, and Medical Treatment of the Teeth, by James Robinson, London, 1846.

† To harden the plaster and prevent penetration of the coloring matter.

‡ American Journal of Dental Science, 1st Series, vol. x. p. 63.

Gold, being costly, was within reach of the rich only; and

Silver was adopted for use in cases where expense was considered. Like gold, the date or place of its first use cannot be ascertained with precision; but it is probable that it was first employed in England, and soon after gold.

Platinum, as a base, accompanied the introduction of porcelain teeth in France. In its pure state this metal is too soft and ductile to retain a given form with exactitude under pressure; and it has hence been generally alloyed with some other metal (silver and iridium have been used), in order to obtain the requisite stiffness.

Aluminum made its appearance as a base about the year 1866; and to Dr. J. B. Bean belongs the credit of first *casting* a base in this metal.* In the state of plate it was hammered or "struck up" into form as easily as silver; but a great, and, at first, an insurmountable obstacle to its use in this manner lay in the impossibility of obtaining a solder or cement with which to fasten teeth to plate of this material. Dr. Bean was the first to *cast* it, in 1866, and he subsequently patented his process. He was speedily followed, in 1867, by Dr. S. Lawrence, of Lowell, with a simplified process, not patented. Afterwards various improvements in its manipulation were introduced, and there were soon invented for it practicable solders. But the difficulties encountered in working it were so great as to prevent its general introduction; and time disclosed a still greater defect. "While it readily withstands the acid secretions of the mouth, it is as readily destroyed in a mouth with alkaline reaction." † Hence it has fallen into disuse. "Aluminum . . . . has not proved as useful as its advocates, and the profession at large, once hoped. It is used by but few." ‡

Various other metals have been used, principally those latterly discovered, as *iridium*, *palladium*, and *rhodium*. These are employed generally as alloys of platinum, and each seems to serve a good purpose; but they are not of sufficiently general applicability, or easily enough manipulated, to have come into any extended use.

Moulded or "*poured*" *tin* bases were first used by Dr. Edward Hudson, of Philadelphia, about the year 1820,§ but appear not to have attained much importance at his hands. In 1836, Dr. Wm. A.

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* Dental Cosmos, vol. viii. p. 376.

† Report on Mechanical Dentistry, American Dental Association, meeting of August, 1874.

‡ Report on Mechanical Dentistry, American Dental Association, meeting of August, 1875.

§ American Journal of Dental Science, 2d Series, vol. iv. p. 545.

Royce, of Newburgh, New York, cast bases in tin; but became dissatisfied with them, and substituted a gold or silver plate with poured tin gums. To prevent corrosion of the tin, he attempted its galvanization with gold, but failed; the gold coating rapidly wearing away."* It will be noticed that Dr. Royce's last process constituted a metallic continuous gum.

In 1850 Dr. George E. Hawes revived the process;† and, being very materially aided by the progress of liberal ideas in dentistry since the times of Drs. Hudson and Royce, gave the poured tin base a much wider celebrity than it had yet obtained. At first it was received with great favor; but it was not until finally presented by Dr. Alfred A. Blandy, in 1856, that this method took a strong hold on the profession. Dr. Blandy devised an alloy of tin, which proved superior in ease of manipulation, and in durability, to the pure metal; and, having patented his alloy and processes, introduced them under the title of *cheoplasty*. It received, from time to time, very flattering notices from men eminent in the profession. Dr. Harris said of it, in 1859, "Thus far, we believe it has realized the expectations of its most zealous advocates. . . . From results which have come under our own observation, the use of it seems likely, in a very short time, to become general."‡ In spite of Dr. Harris's prophecy, however, cheoplasty has not come into greatly extended use. "This, like all other alloys, fusing at a low temperature, and of which tin forms the principal part, has never obtained a universal popularity, and although it has from time to time been much improved by different experimenters, . . . it does not seem likely that it will become *the* substitute for rubber."§

Gutta-percha, for bases, was first introduced in England, by Edwin Trueman, about 1851. He called his process *auroplasty*, from the fact that his finished bases were electro-gilded. The dentists of this country immediately began experimenting, and in 1855 N. B. Slayton, of Madison, Indiana, brought out his "colored gutta-percha base."‖ Although it had first been designed for permanent sets, a short period of experimenting proved it not entirely successful as such; and Mr.

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* New York Dental Recorder, vol. v. p. 61.

† Ibid., vol. iv. p. 286.

‡ Harris's Principles and Practice of Dental Surgery.

§ Report on Mechanical Dentistry, American Dental Association, meeting of 1875.

‖ This was simply Trueman's base under another name. They were both formed of wire frame-work (gold generally) covered with gutta-percha. Trueman's was afterwards electro-gilded, while Slayton's was not.

Slayton claimed value for it only in temporary dentures; for which purpose it attained to a considerable popularity; which, however, was not enduring, and the compound has long been abandoned as a base.

Vulcanite.—In 1851, the publication of Nelson Goodyear's process for making the hard rubber compound, afterward called "vulcanite," turned the attention of those interested in many manufactures to the adaptation of this material, which was announced to be a substitute for horn, bone, and ivory, as susceptible of being colored, and as having all the plasticity of gutta-percha or caoutchouc, while exempt from the action of heat, cold, and acids.

With such a combination of properties in one material, it seems unaccountable that the dental world did not at once adopt the new discovery. It was not until 1855 that Charles Goodyear, Jr., obtained in England a patent for making a dental plate of hard rubber, in which the teeth were secured before the compound was vulcanized. This was the first recorded or published suggestion of this use of the new material, which contains not only the adaptation of vulcanite, but also the use of the *mould* as now employed. It is true that the Cummings patent, so widely known, has been sustained by the courts as possessing the merit of invention in both these respects; but neither the Cummings caveat of 1852, his application of 1855, nor his application of 1864 mention the use of a mould; and it is not until his *reissue* of 1865 that we find he had included this part of the process; which he did by then embodying the description contained in Goodyear's English patent of 1855.

The mould (the very heart of the vulcanite process) was first derived from Dr. Royce's experiments with poured tin plates in 1837–38; and was perfected by Dr. George E. Hawes in 1850, also in connection with poured tin, as before noticed.* It is probable that from these inventors Mr. Goodyear derived his method.

In 1856, Dr. Putnam, of New York, experimented extensively with the vulcanite. The principal difficulty he encountered was in improving the objectionable color of the material.

The general practice in this construction has always been according to the process of Nelson Goodyear, by packing the moulds before closing them; and so perfect was this process, in its original form, that almost no essential improvements upon it have been made. The process of Dewar (English, 1860), operated by first closing the mould and then forcing the composition into it with a cylinder containing a piston (as a syringe), has never obtained any very wide employment in this country.

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* American Journal of Dental Science, 2d Series, vol. i. p. 8, and former references.

The Vulcanite Litigation.—To attempt a critical and detailed review of this subject would occupy a volume larger than this one. We shall note only the most prominent facts in connection with it.

Subsequent to the patent of Charles Goodyear, Jr., for dental plates, before mentioned, John A. Cummings obtained (June 7th, 1864) another in this country for a similar purpose. Cummings had filed a caveat in the matter as far back as 1852, and had applied for a patent in April, 1855; which application was rejected. Another was more successful; and a patent was finally issued to him in 1864, as described; and reissued January 10th and March 21st, 1865.

The almost universal applicability and consequent value of the new material led many to endeavor to secure a share in the profits sure to arise from it; and several new processes for its manufacture were devised and patented. Chief among such of these as especially related to dentistry were the following: that of Edwin L. Simpson, of Newbrough and Fagan, and of William Muller.

In 1855–6, Dr. C. S. Putnam was prominent in introducing the material and process before the dentists of New York and the vicinity, under the patronage of Charles Goodyear, Jr. Others also engaged in its introduction, under one or other of the various patentees and companies; and the profession began to use vulcanite largely.

The several original patents of the Goodyears and Cummings relating to dental bases passed through a variety of transfers and assignments, and finally to the ownership of the Goodyear Dental Vulcanite Company. In the course of their transmigrations, suits against alleged infringers were instituted, which resulted uniformly in favor of the plaintiffs.

In the midst of this litigation the dentists occupied an anomalous position. Their necessities called for the use of the material in dispute, which they could obtain only at the expense of license fees and the high prices charged for the gum; and it was even impossible to clearly determine, amid the various questions of title and right to sell then pending in the courts, as to the value of any license held or proposed to be bought; for each new claimant offered, and sold, such licenses, insisting that they would protect the buyer against all attacks of adverse parties.

That all these representations of the conflicting licensors were not equally valuable, the dentists who had attended to them soon found to their cost; for the owners of the Goodyear and Cummings patents attacked as well the dentists who used, as the licensor who sold, any vulcanite other than their own. Many dentists, either intimidated by threats, or not desirous of litigation, acceded to the demands of the rubber companies; but some held stoutly out, and were accordingly sued.

The feeling in the profession against the vulcanite patentees, and their action, became very decided; and, early in the history of rubber litigations, dental protective societies and unions were formed in all parts of the country, for the purpose of assisting any who might sustain suits brought against them for the use of vulcanite. Contributions were made, and considerable sums raised to this end; and, many of the profession assumed a posture of defense. The United States Dental Protective Union, in Boston, the New York Dental Protective Union, and the American Dental Protective Society, were, perhaps, the most prominent of these associations.

In October, 1864, suit was commenced, on the part of the Dental Vulcanite Company, against Isaac J. Wetherbee, a dentist of Boston. But a decision was rendered against the defendant in May, 1866, and the case was not appealed.

In March, 1868, a suit was brought by the Goodyear Dental Vulcanite Company against George Evans, of New York, who held a license under the Simpson patent; which was declared an infringement of the Goodyear patents, and the cause was given to the plaintiffs and an injunction issued.

In September, 1868, suit was begun by the same plaintiffs against Benoni E. Gardner, of Rhode Island, who held under Newbrough & Fagan's patents. At first, this case was defended by Newbrough; but, before the cause came to a final hearing, he entered into an arrangement with the plaintiffs by which they became the owners of his patents, and thus his licensees were left to shift for themselves. The Gardner case was decided in favor of the plaintiffs in the Circuit Court in Rhode Island; but an appeal was taken to the United States Supreme Court, where the decision of the lower tribunal was sustained.

Between the taking of this appeal, however, and its hearing, facts came out, and revelations were made, which seemed to point to the conclusion that the case, as presented, was a collusive one. Acting on this information, Dr. Samuel S. White, on behalf of himself and many others, dentists, moved the Supreme Court to dismiss the appeal; which, after argument, was done, and an order made to recall the mandate that had been issued to the Circuit Court. This conclusion made it necessary for the rubber company, if they would establish their claims, to bring new suits. This they did; and such suits now multiplied; it was therefore necessary to come to some final action which should determine a definite status of the parties toward each other. In this crisis Dr. White was requested by many of the most prominent dentists to assist in the preparation of a case which should contain all that belonged to the dental profession by discovery, use, and publication; the expenses of the litigation to be paid by voluntary contributions from the profession. An agreement was now made between counsel whereby the proofs to be taken in a certain case against Daniel H. Smith, a dentist of Holyoke, Massachusetts, should also be taken as the proofs in several other causes then pending; thus making this a test case. On the 14th, 15th, and 16th of January, 1874, this case was argued in Portland, Me., before the Hon. George F. Shepley. The opinion of the court, sustaining the patent, was given May 8th, 1874; and the final decree was entered August 18th, 1874. Immediately thereafter all the necessary formalities were complied with (the supersedeas bond filed, etc.) and an appeal to the Supreme Court of the United States perfected; thus arresting the execution of the judgment against Dr. Smith. In this condition the case still rests, not having been yet reached on the calendar of that court.

The cases noted are the principal among many which have been instituted, and which we are compelled, through want of space, to pass in silence. Dr. White received the approval of the profession for his action in their behalf, as witness the resolutions of thanks to him by the American Dental Association,* the Harris Dental Association,† the New York State Dental Society,‡ the Merrimack Valley Dental Association,§ and many others.

Collodion.—This form of base material was devised and patented in England, in 1859, by John Macintosh. It was at first received with indifference, the attention of the profession being largely absorbed by vulcanite at the time; but when harrassed by the rubber companies, and when all were in search of a substitute for vulcanite, collodion received greater attention, and was experimented with sufficiently to prove that by its then process of manufacture no reliable results could be obtained. An improvement was then made by Dr. J. A. McClelland, who introduced his material under the somewhat flowery title of

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* Transactions of Amer. Dental Assoc. for 1872, p. 28, and for 1874, p. 21.

† Dental Cosmos, vol. xv. p. 354. ‡ Ibid., p. 415. § Ibid., p. 415

Rose-Pearl.—At the first appearance of this compound there were found in it many defects; which were largely corrected, and the process assumed some importance, particularly in the West. It is regarded at present with much less favor than formerly, as appears by the following extract from the Transactions of the American Dental Association for 1874: "Rose-pearl, owing to the complicated method of its manipulation, has not grown into that general favor which was anticipated for it. The material itself, in its improved form, appears to possess many of the properties necessary for a good and durable base."

Celluloid.—In 1870, Isaiah Smith Hyatt and John W. Hyatt, Jr., obtained a patent for a method which has apparently solved the problem of converting collodion into a homogeneous and durable solid, in masses. To their compound they gave the above name.

This is, essentially, a mixture of camphor gum, finely comminuted, with cellulose fibre. Being naturally colorless, it requires only a small proportion of coloring matter to produce any desired tint. It has been found to be strong, light, plastic under heat, and elastic when cold. It can be remoulded frequently without injury, and may be repaired easily and promptly through its perfect welding properties. An objection occurring in its first forms of manufacture—that of warping—has been nearly obviated, and the new composition has become rapidly, widely, and well known, and is in very extensive use as a substitute for rubber.

Porcelain.—This material, used as a base, was introduced to the profession in this country by Mahlon Loomis, of Cambridgeport, Massachusetts, in 1854, although the making of teeth and plate of porcelain, in one piece, was the method practiced in the first fabrication of porcelain dentures in France, in 1774. Mr. Loomis had great confidence in the ultimate success of his process, and regarded it as easy of manipulation and adaptation. But the profession encountered very great difficulties with it in these directions, principal among them being the almost impossibility of properly governing the shrinkage of the material in firing; and Mr. Loomis's process, although experimented with to some extent, never attained to much importance.

Dr. Dunn made many improvements in this form of base. In 1867 the Committee on Mechanical Dentistry in the American Dental Association noticed his processes in the following commendatory language: "We would further call your attention to a style of work known as the porcelain base, presented by Dr. Dunn, of Delaware, which, with its present improvements, promises to a great extent, at least, to supersede rubber for full sets."

But the manufacture of this base is difficult and uncertain, and not within the capabilities of time or training of most of the profession; hence it has not come into general use, although, when properly made, it constitutes perhaps as excellent a base as has ever been employed. "As the highest production of skill and art, a well and faultlessly made plate of porcelain stands pre-eminent. . . . . But the more than ordinary skill and experience requisite in the carving of the denture, together with the difficulty in calculating or making allowance for the uncertain shrinkage of these plates (which shrinkage, unless accurately provided for, must destroy the close adaptation to the parts to be fitted), will necessarily limit its use to a few experts. Specialists can alone hope to become universally successful."*

Several other materials, in addition to those named, have been from time to time brought to public notice, in almost every case accompanied by the assurance that the long-desired perfection in bases had been at length reached. We may mention as instances, the *electrotype* process, in which a properly prepared cast received a galvanic deposit of the metal desired, thus producing a perfect fac-simile of the parts at the minimum of expense and trouble, the durability and freedom from hurtful extraneous influences being limited only by the extent of those qualities in the metal employed; and the *adamantine*, a base of cast fusible metal.

These attempts, however, have generally been unattended by the success and benefits hoped for from them; and gold, vulcanite, celluloid, and platinum are to-day, as they have been for many years, the principal materials on which mechanical dentistry relies.

ATTACHING ARTIFICIAL TEETH TO BASES.

Riveting.—The first practiced method of securing teeth to the base was by rivets. This applies more particularly to ivory and natural teeth, although mineral teeth (other than the French) were for a considerable time often fastened in this manner. The ordinary practice with human, animal, or hippopotamus ivory (called *dentine* by Robinson†) teeth will best be described by extracts from his work.

"The exact point [on the plate] where the rivet is to be inserted . . . . must now be ascertained. This is done by temporarily fixing the teeth in their intended places on the plate by means of a piece of warm beeswax, on the removal of which a raised point will be observed, corresponding to the openings in the teeth; and at this point the rivet is to be inserted by first drilling a hole of the same size as the gold wire intended to be used for the rivet, and soldering it [the rivet] to the plate.

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* Report on Mechanical Dentistry, American Dental Association, 1875.

† The Surgical, Mechanical, and Medical Treatment of the Teeth, by James Robinson, London, 1846.

"The teeth (if natural) are to be fastened on the pivots by means of a little floss silk wound round the latter, which must be previously indented or jagged with a file. Moisten the silk with mastic varnish, and press the teeth *firmly* on. When mineral teeth are used, and the length of the pivot will allow, the above method of fixing may still be employed."

Before the publication of Mr. Robinson's work, it was often customary to allow the rivets to pass entirely through the teeth, and to rivet them, after placing the teeth in position, by light taps of a small hammer. This method was found inefficient, as the head formed on the rivet was worn or broken away in mastication, and often required re-riveting. In mineral teeth this fault was finally corrected by fixing the rivet or wire in the substance of the tooth before baking or "firing" the latter, though this transformation in tooth fabrication took place slowly, and was preceded by baking into the tooth a platina tube, which passed entirely through. In these cases, the tooth was fastened generally as follows,—to again quote Mr. Robinson: "Place the teeth on their rivets and insert a small quantity of sulphur between the rivets and the tubing; hold the plate over a spirit-lamp until the sulphur melts; then allow it to cool gradually, and it will be found that the teeth are securely fixed to the rivets." Mr. Robinson adds, that "some dentists use pewter solder in the same manner; it is objectionable, inasmuch as it yields a constant metallic taste in the mouth."

The French mineral teeth, having a groove flanked by platinum studs lengthwise of their backs, were fastened either in the manner first described, by pivots, or by soldering a *backing* or gold plate to the platinum studs.

With those mineral teeth possessing a protruding perpendicular pivot in their bases, the method of procedure will be sufficiently obvious without description. But as correct principles of manufacture became gradually apparent, the *pivot* was changed to the *pin*, and transferred to the back of the tooth; upon which necessarily followed the operation of *backing and soldering*, one sufficiently familiar to the profession at this time.

The processes mentioned possessed inherent defects which grew to be more obvious as dentistry progressed. A wider range of materials, and the increased demand for better artificial dentures, produced a necessarily consequent improvement in processes; and, as each one engaged in mechanical dentistry strove to outstrip his fellow-workers in the race for perfection, the modes of securing teeth to the base soon became vastly more varied and perfect than had been before supposed possible.

Probably the greatest advances have been made in the direction of *Continuous Gum.*—This term is used to designate the fastening of porcelain teeth to plates by means of a fusible compound, applied on the base and around the teeth, moulded and colored to represent the natural gum, and finally fused; thus making an almost homogeneous mass of the teeth, gums, and plate.

The first appearance of this branch of the art was between the years 1815 and 1820 in France. M. de Chemant, who, as has been stated, claimed and was allowed patents for the invention of mineral, porcelain, or incorruptible teeth, first constructed his dentures in one piece, the gum part being painted after vitrifaction. This paint was easily destroyed by wear; and MM. Fonzi and Delabarre (1815 to 1818), substituted jeweler's enamel for De Chemant's paint. This cracked and wore away, and M. Delabarre (1819–20) conceived the idea of imbedding the separate teeth in the base and joining them thereto by a composition which should fuse at a lower heat than the teeth or base, and, being properly moulded, with the coloring matter *in the substance of the material,* should thus form a continuous gum of indestructible color, and which should also fasten the teeth in their places. This M. Delabarre did, and thus constructed the first "continuous gum."

In this country, single teeth and blocks with gums, called "gum teeth," were first made about the year 1835.

In this year, Dr. Henry Villers, then of Albany, New York, introduced what he calls* "the method of uniting single teeth into full sets, in masses with gums, and fixing them to gold plates." Dr. Villers pivoted his teeth to the plate, not relying on the gum composition to fasten them. In the same year, Dr. Josephus Brockway, of the same place, made "many sets of upper teeth, 'continuous gum,'"† presumably in the same manner as Dr. Villers.

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* Letter of Dr. Villers, in New York Dental Recorder, vol. vii. p. 52.

† Introductory Lecture before the New York State Third District Dental Association, January 12th, 1869.

In 1840, Samuel W. Stockton made single and block teeth with colored gums. Dr. George E. Hayes, of Buffalo, also made such teeth in this year, having, at the time, never seen or heard of any such.

On September 18th, 1847, a patent was issued to M. Levett and H. Davis for "an invention for concealing the metal work used in the insertion of artificial teeth."* This was what was then, and has since been known as "Levett's Patent Enamel." It was found, on experiment, to crack and scale off, and so proved to be of little value.† M. Levett, however, sold "rights" to numerous dentists. He also proposed to the New York State Society of Dental Surgeons to grant rights under his patent to its members for one hundred dollars each, for seven years' use, ten per cent. of the amount of such sales to be placed in the funds of the Society; which proposition was accepted.

In 1834, Dr. Thomas Harrison, of Buffalo, commenced experimenting in continuous gum work, and in 1843 made a set of such teeth, which were in use for eight years thereafter.‡ Dr. Jonathan Dodge also experimented in 1845 with this work.§

About the years 1846-7, Dr. John Allen, of Cincinnati, began the investigation of this subject, and Dr. William Hunter also experimented at this time. On the 29th of April, 1851, Dr. Allen filed a caveat in the patent office for "a fusible cement, of which an artificial gum is formed, applicable to artificial teeth, and by means of which they are set."‖ At the twelfth annual meeting of the American Society of Dental Surgeons, in Philadelphia, August, 1851, Dr. Allen exhibited specimens of his manufacture. At the annual meeting of the Mississippi Valley Association of Dental Surgeons, held at Louisville, Ky., in September, 1851, Dr. Allen again exhibited his invention, and a resolution was offered awarding him a gold medal; which resolution, however, after a spirited discussion, was not acted on.

In December, 1851, Dr. Allen obtained a patent for his invention, and, a year later, began a suit against Dr. William Hunter for an alleged infringement, which cause was decided in favor of Hunter.

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* *Vide* specification of patent.

† C. T. Cushman, in American Journal of Dental Science, 2d Series, vol. i. p. 63.

‡ Testimony of Dr. H., in the Allen-Hunter case, Dental Register of the West, vol. viii. p. 286.

§ Ibid., p. 292.

‖ Dental Register of the West, vol. viii. p. 284.

Finally, in June, 1855, appeared a card from Dr. Hunter in the dental periodicals, announcing that "the unpleasant controversy between Dr. Allen and myself, which led to the suit, has been amicably reconciled since its termination," and that Dr. Allen would henceforth be entitled to "any advantages he or the public may find in any ideas that have been regarded as peculiarly my own."

Such is an exceedingly condensed account of a trial which excited considerable interest in the profession at the time. Dr. Allen continued the sale of "instructions" in the use of his compound.

But there were great inconveniences in its use. Some of these are mentioned in a Report on Mechanical Dentistry to the Associated Alumni of American Dental Colleges, March, 1854,* by M. D. French; who states that "the plate is liable to spring, and the gum to crack off, and many dentists who adopted it practiced it only to find their high hopes of its ultimate success disappointed, and have hence abandoned it altogether." Dr. French hints, however, that this ill success may be attributable to "an improper manner of compounding and working the material, or an imperfect adaptation of the plate to the mouth." In these conjectures, he was probably right; for the invention is now in use to a considerable extent, and takes rank as nearly the most perfect of artificial dentures. The difficulties experienced in its preparation and manipulation still exist, and form an effectual barrier to its general employment; as only great skill and experience may make it a success; and therefore it is confined almost to specialists. But, certainly, in their hands, the process produces very elegant dentures.

In order to overcome the obstacles met with in the working of porcelain continuous gum, many devices have been presented. The most prominent of these, and the one which has attained the strongest hold in mechanical dentistry, is the use of

Vulcanite.—This material possesses the advantages of facility of working, cheapness, and perfection of adaptation, in a high degree; and its use has, therefore, become greatly extended. It is often applied on gold plates, and thus produces very excellent dentures.

The more fusible of the metals have also been much employed in this kind of work. *Tin* was first used in this way, in 1838, by Dr. Royce, of Newburgh, N. Y., the originator of the "poured tin" process. *Amalgam* was also employed by packing it around the teeth placed on the plate, and the mercury afterward evaporated by heat.

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* American Journal of Dental Science, 2d Series, vol. iv. p. 531.

At first, the adhesion of the amalgam to the metal base was relied on to support the teeth; but sufficient strength was not found to be thus attained, and the teeth were then soldered on as usual, amalgam being finally used to finish the work and close all crevices. The evaporation of the mercury, however, left the added amalgam porous, and thus allowed the deposition of the liquids of the mouth in the very substance of the material used to prevent such action; and, although various means were devised to remove this objection, such as flowing the otherwise finished work with solder, the process never received any extended favor, and soon fell into entire disuse. Gold was mostly used for this amalgam, being employed in the form of foil, and laid on and mixed with mercury and sulphuric acid in a wedgwood mortar.

SECURING ARTIFICIAL DENTURES IN THE MOUTH.

The old methods of securing natural and ivory teeth in the mouth by ligatures and pivoting have been already treated of; and this section will consequently be devoted to the manipulation of porcelain substitutes.

With these, at first, the modes were similar to, because taken from, the treatment of natural and ivory teeth; being varied only by the different necessities of porcelain.

Pivoting was the most popular manner of introduction, and was practiced wherever the circumstances would allow, with general assurance of success. The operation was certainly meritorious; for it has survived all the mutations of practice, and is almost as much in favor to-day, as it was fifty years ago.

The modes of procedure were various, and only the most prominent, through excellence or ingenuity, will be noted.

Perhaps the most used of all methods was that in which a plate tooth had soldered on it a strong metal (gold or platinum) pivot. In some cases the hole in the root was plugged with *wood*, which was perforated lengthwise and received the pivot, previously squared on its sides. Wood for this purpose is now almost abandoned; but has substitutes, as gutta-percha, or oxychloride.

Another method was by wood pivots; the teeth having holes in their base for the insertion of the pivots or pegs. This method is in full use at this time, although it has been strenuously opposed by many who have insisted that the wood absorbs moisture and thus induces decay in the root, and that the swelling of the moistened wood endangers the safety of both crown and root. By later devices in connection with wood pivots, these objections have been almost entirely removed. The root, having been properly filed, sometimes receives a coating of gutta-percha, warmed or in solution, on which the crown is tightly thrust, thus making a comparatively tight joint. Other materials, as the various plastic fillings, are, or have been, in use in this manner.

But, previous to these improved modes, it was not considered proper to tightly close the joint between root and crown. On the contrary, canals were cut, either along the pivot or the side of the hole in the crown, or hollow pivots were used, in order to allow the escape of any pus which might form subsequent to the operation. More correct practice has since decided, however, that disease should be cured or removed before the insertion of pivot teeth.

The method of splitting the pivots to insure their retention, was practiced at an early period. The pivot was often scored, before splitting, into barbed points on its sides, to aid the grasp of the halves on the sides of the cavity into which it was thrust.

Various devices to insure correct adaptation of the crown to the root have been invented. The pivot counter-drill has been long in use for this purpose. Dr. E. Townsend, of Philadelphia, introduced the oval and hollow file, one fitting exactly into the other; the first being used on the crown, and the last on the root; thus securing a very perfect adaptation.

Vulcanite has been used in pivoting, but is now generally abandoned. A gold wire was wrapped with gum, which was vulcanized around it, and the pivots cut off as desired; or the vulcanite was formed into a tube, which was inserted in the canal of the root and received the pivot; which was formed from the wire on which the tube had been vulcanized and thus fitted accurately.

In cases where decay has enlarged the root canal and weakened the walls, oxychloride is used to advantage. The decay being removed, the cavity is nearly filled with moist oxychloride; and the crown is returned to its place, the pivot entering the plastic filling, forcing it outward and upward into the joint, and being securely retained upon the setting of the oxychloride. Much of the success of this procedure will depend upon a proper proportioning of the size of the pivot and canal and the quantity of plastic filling.*

Another and most artistic method of setting a pivot tooth is, to enlarge the root canal so that it may be filled with gold around a platinum or gold plate pivot, the gold filling being extended so as to either include the base of the porcelain crown, or simply to grasp and hold firmly the plate.*

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* Dental Cosmos, vol. v. p. 219

Clasps are the outgrowth of the old-time ligature. When first used, they consisted of gold wires soldered to the plates, and partly or wholly encircling the sound teeth which were sufficiently near the inserted denture. The wires, however, were soon found to be objectionable; as, by attrition of their narrow surfaces, they cut into the substance of the teeth they encircled; and, besides, did not secure a sufficiently firm and unyielding position of the inserted teeth. They consequently gave place to flat and broad bands of gold or silver; which being accurately fitted, gave the maximum of security with nearly the minimum of defects. Dr. James Gardette, of Philadelphia, initiated the use of this method.† Its utility was, at first, questioned; but it lived down opposition, and became firmly established.

Still, the hard surface of metal in contact with the natural teeth was undesirable; and clasps have been fitted with gutta-percha on their inner sides, to great advantage.‡

The principal difficulty encountered in the insertion of artificial dentures has been their proper retention *in situ*. In pivoting, this was, by the very nature of the method, fully and easily secured; but where pivoting was impossible or inadmissible, clasps were generally resorted to, and succeeded very well with partial dentures, where alone they could be used. But in cases of whole dentures, especially upper ones, the obstacles encountered were great and numerous. *Loading the plates* was largely practiced with lower dentures, and consisted simply in adding weight to the plate by fusing metal on its surface. This method is no longer in use.

Springs were, for a long time, almost the only manner of securing upper dentures. They were known to Fauchard, in 1728, as appears by the following passage from his work, vol. ii. p. 282: "We now use, in order to join together the two dentures, hinges and *springs* in the form of a screw, or simply curved in a spiral manner."

The method was, to form a spiral spring of gold wire, in the ends of which were fastened pieces having, either pins at right angles, or holes in the same direction. Holes being drilled from side to side in the blocks on each side of both upper and lower dentures, or headed pins fastened in these places and projecting laterally, the springs were slid upon the pins or into the holes; and, being bent backward in a semicircle, served by their tendency to straighten themselves, to keep the dentures pressed against the jaws. Where only an upper denture was required, the springs were soldered to clasps encircling the lower molars.

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* Dental Cosmos, vol. xii. p. 399.

†Biographical Notice of (the late) James Gardette, Surgeon-Dentist, of Philadelphia (publishel 1850), p. 17.

‡ Dental News Letter, vol. x. p. 141.

The disadvantages attendant upon this method are even more obvious to-day than they were when the springs were used. Among them may be named, impossibility of preventing the collection of secretions and food in the springs, difficulty of cleansing, and inconvenience to the wearer. Apparent as these objections now are, they were also appreciated at the time; and some mode which should fill their place and allow of their discontinuance, was eagerly sought.

This was considered to have been found in the principle of what Desirabode calls "coadaptation." About the year 1800, Gardette, of Philadelphia, having inserted an upper denture, temporarily without springs, was surprised, some time after, upon calling on his patient in order to supply the springs, to find that she had, by use, become able to retain the denture perfectly.* Dr. Gardette attributed this to *atmospheric pressure* on the plate, and afterward constructed his upper dentures entirely in this manner; and, in the controversy which afterward ensued on this subject, its discovery was claimed for him. But there is abundance of proof to support the assertion that Dr. Gardette's case was simply one of excellent adaptation of the plate, rendering it easy for the patient to support the denture by involuntary and instinctive movements or contractions of the muscles of the oral cavity. In support of this view we may cite Dr. Solyman Brown in his "Mechanical Dentistry." "Inasmuch as the pieces which I am now describing, are those which by some have been called 'suction plates,' and by others are said to be retained in position by atmospheric pressure, I deem it proper in this place to express an opinion . . . . that few pieces of this kind are fixed firmly upon the gum, and used successfully for purposes of mastication, by mere suction or atmospheric pressure, without any aid from the tongue, lips, cheeks, and antagonizing jaw." "The manner in which the surrounding parts operate to secure such a plate *in situ*, is too well known to need any illustration even to the youngest student of our art."†

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* Biographical Notice of (the late) James Gardette, p. 19.

† American Journal of Dental Science, 1st Series, vol. ii. p. 267.

It is certain, however, that to "atmospheric pressure" was almost universally attributed the results obtained by perfection of adaptation.

In 1835, Dr. Chapin A. Harris designed what he calls an "air-chamber"; being simply a depression in the surface of the plate, projecting downward from the palatine arch. This is the earliest date recorded for the use of "cavity plates," as they afterward came to be called.*

In 1840 (July 3d), Alfred Riggs, of New York, received a patent for a *chambered plate* of the following description: "He struck a plate to fit the mouth accurately, and perforated a portion of the surface resting on the palatine vault with small holes. Over this a plate was struck forming a chamber about one line in depth at the centre, vanishing to the alveolar ridge, and soldered firmly to it."† This form of plate has been abandoned, because of the drawing of the gums into the apertures, producing inflammation,—and because it was very difficult to keep clean.

In 1842, Amos Johnson, of New York, made a cavity plate of his own device, for which he prepared drawings and specifications, preparatory to obtaining a patent, but did not, from some cause, do so.‡ The cavity was a simple crescent-shaped depression in the palatine portion of the plate.

About 1845,§ Dr. J. A. Cleaveland, of Charleston, S. C., constructed a cavity plate, by first fitting an ordinary plain plate, and cutting out of it a central opening about three-quarters of an inch in diameter, inside a ring formed by a half-round wire which had been previously soldered to the plate. A second, dished, plate, somewhat wider than the opening, was then soldered over it; thus making an inclosed cavity with overlapping edges. The rounded wire served to stiffen the plate, and to prevent unpleasant chafing or irritation of the gums.

In February, 1848, Levi Gilbert, a confectioner, of New Haven, Conn., obtained a patent for "atmospheric pressure plates," in which the following is claimed: "My invention is the application of atmospheric pressure to plates used in dentistry: the plate being single, and a chamber being sunk in the central part of the upper surface of the plate, in which a vacuum can be formed by the tongue."*

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* Dictionary of Dental Science, p. 501.

† American Journal of Dental Science, 2d Series, vol. ii. p. 420.

‡ New York Dental Recorder, vol. ii. p. 77.

§ Harris's Dictionary of Dental Science, p. 501.

Upon the publication of this patent, Mr. Gilbert was met by the assertions of dentists on every hand, that his application had been known and practiced for years before. Many claimants for priority of this invention made themselves known; and he was soon satisfied that their claims, however they might stand in relation to each other, were superior to his. He eventually abandoned his patent.

Not so the profession, however; who, having tested the improvement fully, and found it worthy, almost unanimously adopted it. A committee appointed by the Pennsylvania Society of Dental Surgeons to investigate the merits of the "Gilbert plate," while reporting evasively on the question of priority of invention, said, in regard to its practical value, "In a great number of cases it has been most markedly successful, and in cases, too, where springs had been unsuccessfully applied by different operators, and they believe also that this happy result has been from the use of the 'Central Cavity Plate'." The report concluded with a recommendation "that a certificate of approval of the Central Cavity Plate should be awarded to Mr. Gilbert by the Society."† Which action and recommendation were ratified.

The construction of cavity plates was the first application of the veritable principles of atmospheric pressure in dentistry. That it was a great improvement on the old plan is certain; and it has become an integral part of mechanical dentistry.

Many inventions, designed to improve the first principle of a plain cavity, have been presented. Most of them, from complexity or other cause, have not met with the general approval of the profession. A half-round projection surrounding the cavity on its inner edge and jutting out from the surface, is, perhaps, the most important of these, serving, as it does, by sinking into the gum and membrane, to make the vacuum in the chamber more perfect. The valve plate, invented by Dr. W. H. Dwinelle, of New York, is a very beautiful and scientific adaptation of the principle; but, being somewhat complex, is not generally used. The *lateral cavity* plate of Dr. J. F. B. Flagg, invented in 1849, is of more practical importance. This improvement removes the chamber from the palatine arch to the surfaces of the alveolar ridge immediately posterior to the molar teeth. Thus the projection of the chamber in the roof of the mouth is removed, and partial dentures may be inserted without covering the palatal surface with metal.

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* American Journal of Dental Science, 2d Series, vol. ii. p. 421.

† Minutes of the Transactions of the Pennsylvania Society of Dental Surgeons.

The "engraved suction plate" of Dr. Harnett, of New York, though highly extolled by Robinson,* never obtained any extended use, and may be mentioned as one of the curiosities of dentistry. The process was simply, engraving any ornamental design on the inner surface of the plate; thus forming a number of minute convoluted air-chambers.

The cavity plate is now made in all the various plate materials. Years of constant use have proved its value; and it forms one of the greatest advances in prosthetic dentistry.

THE LABORATORY.

Under this head will be treated the manufacture of artificial dentures, including notices of the materials not heretofore mentioned, processes, mechanical devices and instruments, and the various apparatus of the workshop. The limits of this work precluding the possibility of thorough treatment of these subjects, only the most important points will be presented.

Impressions.—For many years, *wax* was the only material known for the process of obtaining an impression or matrix of those parts of the mouth intended to be covered by artificial dentures, the first step to be taken in the construction of the latter. The common product of the bee was the variety used, in its natural state and without other refining than sufficed to remove any physical impurities which it might contain. The process was simple, and consisted in warming a sufficient quantity, with a spirit lamp or in hot water, and applying it to the parts; making such digital pressure on, and working of, the material as should insure its exact adaptation to the sinuosities of the surface covered by it, and then cooling and carefully removing it.

At first the wax was held, during application, directly by the fingers; but various disadvantages experienced by this mode led to the introduction of wax-holders. As these instruments are in use at present, with but little, if any, modification of their form and material from those first used, a further description will not be necessary.

The use of *plaster of Paris* for impressions taken from the mouth was introduced about 1844–5. Who first used it for this purpose it is now impossible to say; but the credit of priority has been about equally divided between Drs. Westcott, Dwinelle, and Dunning. The question of its introduction at one time occasioned much more discussion than would appear at all necessary from the apparent obviousness of the process.

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* Robinson on the Teeth, London, 1846.

Gutta-percha.—Almost the first use of this material, upon its introduction to the profession in 1848, was for taking impressions. It was "thoroughly soaked in boiling water, then kneaded and moulded in the same way as wax to fit the case, . . . and immediately placed in the mouth and firmly pressed to its place."* Its quick and perfect solidification, and the consequent freedom from danger of disarranging the mould in withdrawal, commended its use; and, although it never endangered the permanent use of plaster, it held a prominent place among materials for impressions. It is now, however, little used for this purpose.

Of late, various compositions have been invented, designed to take the place of wax and plaster. Each of these has its merits and demerits, and they have very greatly lessened the use of wax. Plaster, however, with its many and almost unsurpassable advantages, will probably, at least for a long time to come, constitute the main reliance of this branch of the art.

Casts and Dies.—The use of plaster in forming models from impressions previously taken extends back out of record, and has never, for this purpose, had any competitor of sufficient importance or value to demand notice. For a long time fitting to plaster casts constituted the only method of adapting artificial dentures, the casts being painted with moist color, and thus marking their prominences on the plate material as it was repeatedly applied to them. Even after the introduction of metal plates, plaster was still used as the cast, the plate not being then swaged or "struck up," but adapted by bending with proper forceps or pliers, and the hammer and punches.

Who introduced metallic models and counters is not known. The material first used for them, however, was brass or copper. Afterward, more easily fusible metals were employed, as lead, tin, zinc, type-metal, britannia, Babbitt's, D'Arcet's, and other compositions, or a combination of two or more of these. The ingenuity of prosthetic dentistry has never ceased being exercised with the problem of the production of a material for casts and dies which shall possess all the desired attributes of strength, non-contraction, or expansion, adaptability in casting, and facility of manipulation. Various combinations of metals, in innumerable ratios of proportion, have been invented to secure these ends. Electricity has been called to our aid, in producing directly upon the plaster a galvanic deposit which should admit of the pouring of fused metal upon it without destroying the plaster, thus abrogating the employment of moulding sand. This process was the invention of Dr. T. H. Burras, of New York, in 1860.* Dr. W. H. Elliot, of Montreal, mixed his moulds with plaster and sand, and poured the metal (zinc) directly upon them. Dipping the baked plaster cast into melted lead for the mould is also practiced, a mixture of zinc and tin being in turn poured into the lead to obtain the male die.

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* American Journal of Dental Science, 1st Series, vol. viii. p. 258.

Zinc and tin for the cast, and lead or tin for the matrix, are, perhaps, more generally used at present than other formulas, though the materials and proportions are even more varied now than formerly.

A very considerable advance in metallic casting has been the introduction of Dr. George E. Hawes's (New York) sectional moulding flask. This obviates all danger of "dragging" (breaking down the sand) in removing the casting from the mould.†

The adjustment of artificial teeth in the mouth, so that a correct apposition with the remaining natural teeth should be obtained, was little thought of in the earlier days of dentistry; but the growth of the art rendered it at length a desideratum, and finally a necessity. The first attempts at producing this condition were through the medium of *antagonizing casts* of the opposite denture. These long served excellently for the purpose, but were finally aided by mechanical contrivances called *articulators*, which latter have been so far and perfectly developed as to leave little to be desired in this direction. The kinds and models of articulators are so various, and their gradations of comparative value so imperceptible, that none can be particularly noticed.

The Application of Heat in various forms has always constituted one of the principal features of prosthetic dentistry. In the various stages of the manufacture of porcelain teeth a suitable furnace or muffle was needed. As, however, such teeth are now seldom made in private laboratories, being by most dentists procured from special manufacturers, it is not deemed necessary to treat further of such appliances.

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* Dental Cosmos, vol. ii. p. 105.

† New York Dental Recorder, vol. iv. p. 285.

The *blow-pipe* cannot be thus disregarded. This instrument is, perhaps, the most important of any employed in dental prosthesis, and corresponding diligence has been used in its improvement. From the ordinary hollow metal tube and spirit-lamp to the complicated and scientific "oxyhydrogen" is a long stride; yet it has been made in dentistry, and principally within the twenty years last past.

Dr. Hull, of Matteawan, constructed perhaps the most important improvement in the common, straight mouth-pipe. This was the introduction of a cylindrical enlargement of the barrel between the mouth-end and the point, which served to intercept and condense the moisture from the lungs.

Drs. Hook and Jahial Parmly were among the first in the introduction of alcoholic self-acting blow-pipes. The invention of the former consisted in a hollow globe of metal composed of two hemispheres firmly fastened together, which being partly filled with alcohol, and supported over the flame of a spirit-lamp, vapor was formed from the alcohol within the globe, which, escaping through a small curved pipe pointing at the flame of the lamp beneath, was there ignited and forced upon the work. The instrument of the latter was on the same general principle, but so arranged as to more nearly obviate the danger of explosion to which the former was liable.* Various other forms of the alcoholic blow-pipe have been used to a greater or less extent.

Those varieties of this instrument, the motive power of which is hydraulic, have been and are somewhat extensively in use; as is also the case with foot-power apparatus of this kind. The latter, combining many excellencies with but few and moderate defects, is, perhaps, more generally employed than any other variety. There are many kinds, each presenting some peculiar advantage.

With the coming of vulcanite, a new variety of apparatus was introduced into the laboratory. This is the *vulcanizer*, of which there are several kinds. The first in use, comparatively rude and clumsy in construction, and very liable, from faulty manufacture, to explosion, have been replaced by others very much superior in these particulars. None can be singled out as best, or most used. A kindred instrument is that for the management of celluloid. Both these apparatus are still in process of improvement.

Next to the blow-pipe, if not, indeed, quite its equal in importance in the laboratory, is the *lathe*. This instrument was, on its introduction, occupied almost solely in grinding porcelain work; but, in

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* Dictionary of Dental Science, p. 90.

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modern dental laboratories, the complete turning-lathe now has a place.

Although there is no record of the introduction of lathes or grinding apparatus in mechanical dentistry, it is apparent that they have been long in use; for the labor of grinding porcelain teeth or cutting ivory, especially the former, is severe, and the attention of the dentist must have been early directed to lightening it. In the younger days of American dentistry, hand-wheels or grindstones were much in vogue, especially in the practice of itinerant dentists; but foot-power very soon came to be used.

The earliest pedal lathes were of very rude construction, in common with most of the machinery of the time. Improvements, however, were quickly made, and we find in general use to-day the "improved lathe" of Mr. J. D. Chevalier, introduced about 1855. In fact, since that time, almost all the advances have tended to modifications of the ordinary foot-lathe of the mechanic. One innovation, however, is the production of exactly and elegantly-made apparatus for use in the operating room.

The old grindstone was first replaced by the emery wheel, formed by spreading melted glue on a wooden wheel, and dusting powdered emery thereon, which was a common device in ordinary mechanics. This, in turn, made way for the wheel or disk of emery and shellac; which latter are now thrown aside in favor of the newer and better "corundum wheel."

OPERATIVE DENTISTRY.

SIMPLE METALLIC FILLINGS.

It is impossible to discover when, where, or by whom the operation of filling teeth was introduced. It has been claimed for Celsus (100 B.C.), but the claim cannot, we think, be substantiated. The only reference to the operation in question to be found in the works of that writer is, his recommendation to stuff with lead decayed and frail teeth *which are to be extracted*, in order that they *may not break under the forceps.*[*]

Up to the year 1800, the filling of teeth was an operation practiced only by the best dentists. It is probable that it attained a prominent position in operative dentistry sooner in this country than in others; for, in the works of most foreign (and particularly French) dentists, even so late as 1825, we find comparatively little attention paid to this branch, and not much knowledge or method evinced in its treatment, when compared with the best practice of the time in our own country. Koecker, writing in 1826, says, "The slight scientific attention that has been paid to this subject, is particularly proved by the superficial manner in which English, as well as foreign writers, have treated of it in their works."[†]

The earliest recorded material for filling is

Lead.—This metal was used in the form of leaf. A piece being torn off, was rolled between the fingers into a ball or pellet sufficiently large to more than fill the cavity after packing, and was then forced to its place by one or two straight instruments, dressed off and polished with a burnisher.[‡]

This metal, soft and ductile, and easily compressible, long formed the principal filling material.[§] The French word for "filling"

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[*] Celsus, De re Medica, lib. 7, cap. 3, sec. 5.

[†] Koecker, loc. cit., p. 386.

[‡] Desirabode, loc. cit., p. 282.

[§] Ibid., p. 279.

(*plombage*, literally *leading*) is derived from its employment. It was used almost entirely in the manner described. Connoisseurs in the article preferred that variety denominated "tea-lead," because in it was packed the tea received from China. It came with paper pasted on one side, which was readily removed by washing in water, leaving the lead in a thin sheet.[*]

Gold.—Harris says[†] that gold was used as a filling in the early part of the 18th century; but we have not been able to discover any mention of it prior to that made by Fauchard, in the third edition of his work, 1785, book ii. page 68. It is possible that it was employed previous to the last-mentioned date, though certainly not to any great extent; for Harris notes the fact[‡] that it was not until the year 1800 that its use "became common among dentists." Although Dr. Harris is undoubtedly correct in this statement from one stand-point, yet he is, as undoubtedly, not so from another. Among those of the better class of dentists who, residing in large and seaboard cities, had extra facilities for procuring gold, it was early employed; but the greater number of practitioners did not use it ordinarily until long after the date mentioned by him. Dr. Eleazar Parmly[§] states that the first gold filling he ever saw was in 1815, and this was put in by Waite of London; and its introduction into America as a filling is ascribed by Parmly to Robert Woofendale, who returned to New York from England in 1795.[‖]

Gold was first used in *leaf*, as prepared by the gold-beaters; but, this being very thin, it was soon supplanted by *rolled* gold. For a long time after its introduction as a material for filling there was no manufacture of the metal expressly for dental purposes. A dentist in need of gold for filling procured gold coins, and had them rolled by the gold-beater into such thickness as suited his purpose.[¶] From ten to twenty grains was the ordinary thickness used. This gold, of course, was as non-adhesive as tin. The Brazilian *Johannes* (Portuguese) was the coin preferred, it being the purest of any gold money then made.

About the year 1812–13, Marcus Bull began the gold-beating business in Hartford, Connecticut. Here Charles Abbey became his apprentice. While here, dentists would, to use the language of Mr. Abbey, "borrow his 'rolls' to roll out their 'old Joes'" (Johannes). Mr. Bull, arriving at somewhat of a knowledge of dental wants, gradually brought these customers to use his partially beaten gold-leaf, taking their Johannes in exchange. In 1816, Mr. Bull moved his establishment to Philadelphia, where, in 1835, Abbey became his partner, and, upon the retirement of Bull, in 1839, took the business himself. The house relinquished the gold-leaf department in 1835, making dental foil its sole specialty. This was the first house in the country to be specially engaged in the manufacture of dental gold foil, and has, therefore, been thus mentioned.

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[*] American Journal of Dental Science, 1st Series, vol. iii. p. 239.

[†] Dictionary of Dental Science, p. 326.

[‡] Ibid.

[§] American Journal of Dental Science, 1st Series, vol iii. p. 2.

[‖] Introductory Lecture, by J. Brockway, Sr., before the Third District Dental Society, Albany, N. Y., 1869, pamphlet.

[¶] American Journal of Dental Science, 1st Series, vol. iii p. 2.

The first method employed in filling with gold was by pellets, as has been described in treating of lead. Sometimes the pellet, *after its introduction*, was pierced centrally with a sharp instrument, and a cone-shaped roll of gold forced into the consequent aperture, thus wedging laterally.* Some dentists allowed the filling to finally extend beyond the level of surface of the adjoining tooth substance, that it might be further consolidated by mastication.†

This method, with the thick gold then used, would not produce even a *good* filling, except by the application of great force, to which there were many obvious objections. The foil then came to be made thinner, until as low as *two* grains to the leaf was used; but from four to six grains was the average weight of leaf.

Upon the employment of light gold, the form of application became changed. A sheet was rolled or twisted into a 'rope,' which was packed by forcing it into the cavity in folds. In smaller cavities which would not admit a rope, the half or third of a sheet was *folded* over a watch-spring or light strip of steel, and introduced in the same way as the rope.

About the time from 1840 to 1845, isolated members of the profession began to *coil ribbons* of gold upon a winder, thus forming cylinders. These cylinders, however, were still inserted upon the principle of the old-time pellet, being wound so tightly as to be little compressible, and to a size just sufficient to enter the cavity, into which they were forced, first by small and then by larger instruments, the coils being of sufficient depth to extend above the margin.‡ In order to secure sufficient force for the final consolidation, Dr. Cushman, of Georgia, devised a somewhat curious instrument. This was a simple straight plugger in a handle, bent near the point at a right angle, and having melted around the elbow there formed a mass of lead in a flat-globular shape, below which the plugger-point projected. The point being placed on the surface of a crown-filling, final and extreme condensation was effected by the patient biting forcibly on the leaden ball.[*] The principles of cylinder-filling, as at present practiced, appear not to have been perfectly understood at that time.

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* Desirabode, loc. cit., p. 282.

† Ibid.

‡ American Journal of Dental Science, 2d Series, vol. viii. p. 3, *et seq.*

However, it was not long before cylinder filling, as such, came to be employed. It is probable that the method was some time in use, by various operators, before it became, to any great extent, publicly known. Blocks, as well as cylinders, were thus used, the variation being more in name than in reality; for the only difference between them was that the former were wound on *flat* instruments, the latter on *round* or *angular* ones.[†]

It must be borne in mind, when comparing the cylinders or blocks of the past with those of the present, that the former were *tightly* wound, and left only slightly compressible, *before use*.

About 1851, the method of *crimping* foil was introduced in France,[‡] and soon afterward was used in this country, but never to any very great extent.

At this period (1851) the gross annual amount of gold foil used in the United States was about six thousand six hundred ounces, sold at an average price of thirty dollars per ounce, or a total amount of one hundred and ninety-eight thousand dollars.[§] These figures may be considered as tolerably correct, although obtained from manufacturers' statistics; for the practice of rolling or preparing their own foil was, at that date, almost entirely discontinued by dentists, who had gradually come to depend upon special fabricators for their supply.

In October, 1846, Dr. C. T. Jackson, of Boston, had a tooth filled with

Sponge gold, of the manufacture of which he had previously discovered the process.[‖] This was the first use of this form of gold for the purpose named. It attracted, however, very little attention from the profession until 1853, "when Mr. A. J. Watt, of Utica, New York, and Mr. Joseph Barling, Maidstone, Kent, England, appeared (with it) in the field almost at the same time. Mr. Barling does not appear to have patented his preparation,"* but Mr. Watt did; not claiming the invention of the article, but its application to dental purposes.

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[*] American Journal of Dental Science, 2d Series, vol. viii. p. 8.

[†] Ibid., p. 7.

[‡] New York Dental Recorder, vol. vi. p. 196.

[§] American Journal of Dental Science, 2d Series, vol. i. p. 228.

[‖] Silliman's Journal, 2d Series, vol. vi. p. 187.

This preparation of gold was immediately heralded far and wide as the *ne plus ultra* in filling materials; but its first manufacture seems not to have sustained the claims made in its behalf; for it was so easily reduced to powder as to almost preclude its use in the upper jaw, and even in the lower a *spoon* would sometimes have been a proper instrument for its introduction into the cavity. But the patentee quickly improved his processes; and soon produced an article which was open to few objections.

And now "sponge," "crystal," or "crystalline" gold (as it was variously termed), began to be quite extensively used; though its employers, it appears, were still very much in the dark as to its real nature or mode of consolidation. Many and extremely various were the tests applied to it; which, being largely descanted on, in publications and society meetings, led one humorous gentleman to remark that "he would suggest, the addition to it of cod-liver oil,"† as a final test; for the purpose, it is supposed, of lubricating the crystals and thus facilitating their interlocking!

However, the approval of such men as Dwinelle and Arthur was a tolerably certain indication that much real value to the dentist existed in the material; and their approbation and advocation, as well as the merits of the article, secured its very general use at the time, and it is still largely employed, although not to so great an extent as formerly. Other preparations of gold, based on the same principle, have since come into the field in competition with the original article of Taft & Watt.

One of the greatest advantages claimed for crystal gold in its various forms was, its capability of being packed in moisture or in the presence of almost any extraneous substance. It was said to have been tested by working it in water, saliva, and even *flour*, without destroying its cohesive properties in the least, or preventing its formation into a solid plug while in these media.‡ But experience in other hands seems to have required for it even more than ordinary care, as well in securing absence of moisture as in packing the cavity in such a manner as to prevent leaving the plug porous. It is probable that success in its use is more dependent on the skill and experience of the operator than in the case of ordinary foil.

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* Dental Cosmos, vol. x. p. 131.

† Transactions of the American Society of Dental Surgeons, Dental News Letter, vol. ix. p. 11.

‡ Dental Cosmos, vol. x. p. 136.

In the spring of 1855, Dr. Arthur, of Baltimore, advised the profession of a "new method of using gold foil."* At the time of this discovery, he was experimenting with sponge gold; with which, although he had produced excellent results, he was not fully satisfied. His "new method" consisted in thoroughly annealing the foil over a spirit lamp before use; thereby (although the fact, in its full significance, does not appear to have been fully appreciated by him at the time), developing its "*adhesive*" or "*cohesive*" property.† Nor does he appear to have entirely comprehended the great prospective value of his discovery; for he says,—"I have no idea that gold will be used generally in the manner I now recommend."‡ But he shows a correct knowledge of the then conservatism of mankind in general, and the profession which he addressed in particular, when he continues,—"It is exceedingly difficult to induce men to change a course which they have successfully pursued for years, and the difficulties of which they have learned to encounter and overcome, for any new thing."§ His confidence in the process was extreme, and, as has since been proved, well founded. "I confidently say to every operator in the profession, that if fairly tried it will afford advantages in the use of gold foil of which few have dreamed."||

Immediately upon the publication of this process by Dr. Arthur, it was declared by numerous members of the profession that in it nothing new had been told them; that gold foil had been long used in this way. Indeed, Dr. A. Westcott claimed to have accidentally discovered, in 1840, and made use, since then, of this property of gold.¶ It will now be admitted that such was very probably the case. The fact is, that the greatest difficulty encountered by manufacturers in the preparation of foil was this very *stickiness*, as they

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* Dental News Letter, vol. viii. p. 129.

† These words, although not properly synonymous, have been used very indiscriminately by the profession in relation to the peculiar action of annealed gold. "The term *adhesion*, in physics, has been applied to the force by which bodies of different kinds adhere when united; *cohesion*, to the force which unites the particles of homogeneous bodies."—*[illegible]*. In this exact definition, by the eminent physicist named, particular attention should be paid to the differences expressed by the phrases "bodies of different kinds" and "homogeneous bodies," and also "when united" and "which unites." The first evidently refer to *adherence artificially produced*; the second to a *natural or self-existing force*.

‡ Dental News Letter, vol. viii. p. 132.

§ Ibid.

|| Ibid.

¶ Dental Cosmos, vol. xii. p. 57.

called it. Their constant endeavor was to prevent issuing such gold to the profession; but it often got out, despite their care. It is, therefore, probable that sticky foil was frequently used before Dr. Arthur published his method; though it is also probable that most of those who had used it were unaware of its value or special character, and, in many cases, supposed they were employing an inferior and undesirable article.

This innovation again changed, in great measure, the methods of using gold. Ropes were rolled by Dr. Arthur very loosely,* instead of tight, as before; and cylinders of non-cohesive, as well as of cohesive foil, soon came to be thus rolled. An obstacle to the use of the cohesive variety was found in the difficulty experienced in confining the first introduced pieces so that they might be sufficiently immovable to build upon; but this was immediately removed by the use of *retaining pits*, drilled in the tooth-substance; a process first recommended, in shallow cavities and with non-cohesive foil, by Dr. A. S. Talbert,† and in relation to cohesive gold by Dr. Louis Jack.‡ A great change now introduced, also, was the use of *deeply-serrated* plugging points.§

The new form of gold soon became immensely popular. The manufacturers no longer found a difficulty in disposing of their sticky foil, for it was eagerly sought; and they immediately made and sold large quantities of this variety. Reasoning on correct principles as to questions of priority, the Western Dental Society, at their meeting held in St. Louis, May 22d, 1857, passed the following resolution:‖ "*Resolved*, That to Dr. Arthur, and him alone, the dental profession is under obligation, for his liberality in laying before the profession the principle of using and welding together annealed gold, by the use of serrated pointed instruments, and that this Society desire to express their thanks to him for this, one of the real improvements in the mode of operating."

With crystal gold a new era had opened to the profession, in the restoring with gold of broken and lost portions of, and occasionally even whole crowns of teeth. This process was carried still farther with cohesive foil; and restored crowns came to be almost common.

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* Dental News Letter, vol. ix. p. 234.

† Ibid., vol. x. p. 231.

‡ Ibid., vol. ix. p. 234.

§ Ibid., vol. viii. p. 139, and vol. ix. p. 229.

‖ Ibid., vol. x. p. 282.

Then, also, occurred the initiation of "contour fillings," since carried to the perfection which is now apparent. Operations before almost unthought of were now commonly performed; and, in short, operative dentistry took a great stride forward.

But, while this was true, and in spite of it, experience demonstrated the fact that cohesive foil would not answer in all operations. The most serious defect apparent was its liability to "clog," unless used with great care; and this defect operated seriously against it, in many cases. The ultimatum of filling materials had not been attained, as was at first fondly supposed. Therefore, cohesive foil finally settled to its true importance in dentistry; an importance none the less because the form is not universally applicable.

The range of weight of leaf of gold foil has been very extensive. From the first form of rolled "old Joes," weighing ten to twenty grains, it dwindled to two or three; then, rebounding, went higher and higher, until some claimed approbation for using four hundred and eighty grains to the leaf! The weight now most used is, an average of about four to six grains; though the numbers now found in almost every dentist's drawer will cover a far wider range than was even known to the dentist of not more than fifty years ago.

Platinum.—This metal has long been known as a tooth-filling material; though it cannot be said to have been *used* as such,—at least to any very great extent. The many natural advantages possessed by it for filling have always induced experiments with it; which have had the general sole aim of increasing its physical adaptability; since it is considered to equal, if not to surpass gold in most other respects. While the old pellet-process was in vogue, platinum was used in this way; but its harshness and want of ductility and plasticity have prevented its use by the newer methods of operating. A different form, however, has been very lately introduced, which promises success. In it the platinum foil, made thin, is covered by a layer or deposit of gold. This preparation has not been long enough in use to warrant the expression of a final opinion.

Alloys of platinum and gold have also been latterly introduced. Strictly, this form comes under the head of gold-filling materials, the platinum being used merely to harden the foil for particular purposes; but as it is the most prominent manner in which platinum has been employed of late, it is mentioned in this connection. This form constitutes a very desirable addition to "finishing foils."

Silver was once used to a very considerable extent, by the pellet method. It was found, however, to oxydize in the mouth, and possessed also the physical disadvantages of stiffness and want of ductility. It is no longer employed as a filling material.

Tin.—Of the simple metallic fillings, excepting lead and gold, tin has been the most extensively used. It was not generally employed until about 1830; although isolated members of the profession put in tin fillings as early as 1822.[*] It grew in favor, especially for large cavities in molars and for the cheaper class of operations. The time and labor necessary to properly fill a large cavity with gold were much lessened by the employment of tin; for it was softer and more pliable than even lead, and did not harden under the instrument like gold. It certainly oxydized, giving the tooth an ugly, black color, and was therefore generally used only in the back teeth.

It also wore rapidly away under mastication; but could be then cheaply, easily, and comparatively quickly replaced. In brief, it possessed several negative advantages which were opposed by few positive disadvantages; and, for many years, was very extensively employed by the best dentists, with hardly a dissentient voice.

But the growing influence of gold at length made itself felt in opposition to the humbler metal. The introduction of various plastic fillings, too, operated against it; and its employment was finally very much reduced in extent; although it has never been entirely rejected, but is even now considerably used, in the less expensive class of cases.

PLASTIC FILLINGS.

The difficulties encountered in the manipulation of fillings of simple metal have always been obstacles to their successful use; and, in the earlier days of modern dentistry, operated against even their general employment. The ingenuity of the inventive minds of the profession has always been taxed to obviate these difficulties, either by changes in the metals or processes, or by the introduction of some material which should replace the one and render the other less burdensome. In the latter direction, efforts were very early directed toward plastic fillings.

The first of these, from their nature, could serve only a temporary purpose; for they were simple ethereal or alcoholic solutions of some of the gums, as mastic, sandarac, etc.[†] By the best early dentists these materials were decried, and various were the malevolent effects ascribed to them. But it is probable that many of these pernicious consequences either existed more in the imaginations of the disparagers than in sober reality, or were greatly magnified. The dentists of seventy-five or a hundred years ago were very positive and decided men; and anything which was not, in their view, good, could not be sufficiently condemned by them.

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[*] New York Dental Recorder, vol. iv. p. 195.

[†] Robinson on the Teeth, p. 111.

Terro-metallic Cement.—This was composed of a mixture of sulphate of lime and oxide of iron. The "celebrated *anodyne cement*" was similar to it, with the addition of morphia. These cements served only a temporary purpose, the last also having as part of its object the relief of pain. Robinson says, that, a "few hours" after their introduction, "they dry, crumble, and fall out."*

The first plastic fillings which possessed, in any great degree, the attribute of permanence were those sometimes called, somewhat paradoxically,

Fusible Metal.—Of this variety of filling materials, two alloys may be mentioned as the principal. D'Arcet's *mineral cement* was first in the field. This is simply Newton's alloy, of eight parts bismuth, five lead, and three tin, with occasionally the addition of one-tenth part of mercury to hasten the fusing. Fox† speaks of this process as one "which promises to be very successful in all cases where the tooth is not tender and the caries is situated in the centre." But all dentists were not thus lenient. Koecker‡ says of it, "The destructive effects of this process are so evident, and consequently the impossibility of any beneficial result so certain, that I should consider it unnecessary to enumerate its pernicious consequences." This rather polysyllabic denunciation, however, did not prevent the very extensive employment of the much anathematized material. In France this process was, for a time, more used than any other; and was also considerably practiced in this country, where it was introduced in 1820.§

Wood's metal succeeded D'Arcet's, after an interval of disuse of the latter, in 1860.‖ Like its predecessor, it enjoyed merely an ephemeral popularity, and soon fell into disuse.

The first of these alloys becomes plastic at 212° F., and the last at about 140° F.; their manipulation was very similar, being varied only by the different degrees of heat required for each. D'Arcet's was generally melted and poured into the cavity, previously cleaned and dried. Wood's had pieces placed in the cavity cold, and there made plastic with a hot instrument.

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* Loc. cit., p. 111.

† Natural History and Diseases of the Teeth, 1833.

‡ Loc. cit., p. 396 (1826).

§ Ibid., p. 397.

‖ Dental Cosmos, vol. iv. p. 59.

Asbestos.—This curious mineral was experimented with, about 1840, as a *lining* under metallic fillings, where the latter were to be inserted over pulps likely to be sensitive to changes of temperature, it being one of the best non-conductors of heat known.* Dr. Robinson, of London, also recommended it to be mixed with collodion, and introduced as a temporary filling in cases of sensitive dentine.† The material, however, never attained any very extended use for either purpose.

About the year 1826, M. Taveau, of Paris, advocated the use of what he called "silver paste" for permanent fillings. Under this, as it were, shining title, was ushered into the world what was destined to be for years the Hydra of dentistry,—

Amalgam.—Its introduction into this country (the exact date is undetermined) is believed to have been by "the Crawcours," as have ever since been contemptuously denominated two French empirics who came to New York in 1833. Dental writers of the period are unanimous in representing our ancestors of that date as extremely and peculiarly gullible; for, they say, "the Crawcours had an enormous run of custom"; quite sufficiently so, we are assured by a dentist who was then in practice, to seriously interfere with the best business of the profession in their locality. The troubles arising from the impositions of these men, as well as the dissensions consequent on the use of the material itself, will be hereafter treated. At present we shall be confined to an examination of the material and its uses.

The amalgam proposed by M. Taveau was simply a union of pure silver and mercury. Convenience, however, dictated the replacement of purified silver by coin of the same metal. This coin, being filed, had afterward added sufficient mercury to make a paste or plastic mass; from which the free mercury was expressed by pliers, the residue being introduced into the cavity where it soon hardened. This form of amalgam has been, perhaps, more generally and widely used than any other.

In 1848, Dr. Evans, of Paris, introduced an amalgam of pure tin with a small quantity of cadmium.‡ At first, much was expected of this mixture. It was claimed that it did not discolor, shrink, or change in the mouth. But further experiment with it discovered various defects, as contraction and discoloration; which are partially noted by Dr. Evans himself, in a letter to Messrs. Jones, White & Co. in 1849–50.* He therefore advised its discontinuance, and the advice appears to have been taken: for his material was little used. In fact, the addition of cadmium to later amalgams has generally been unsuccessful.† Still, this statement, though founded on considerable research, is not, perhaps, to be entirely relied on; for it is recorded (though only as an opinion) that cadmium, without other metal than mercury, was used (1863) as a filling.‡

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* American Journal of Dental Science, 1st Series, vol. i. p. 241.

† New York Dental Recorder, vol. iii. p. 168.

‡ Ibid., p. 211.

In 1855, Dr. Elisha Townsend, of Philadelphia, proposed an amalgam to consist of four parts silver and five parts tin, melted together and afterward reduced to filings. With these, when about to be used, mercury was mixed in such quantity as to produce a perfectly plastic mass, and the whole was well washed in absolute alcohol. The free mercury was then expressed by squeezing, and the material formed into a stiff cake "which can be broken into pieces and (the pieces) be made to adhere to each other so as to form a uniform solid mass."§ This amalgam was the kind in most general use in 1863.||

Among the metals latterly used in amalgams, palladium and platinum may be mentioned, though not fully treated of, for they are still in process of trial.

The earlier amalgams frequently had mixed with them non-metallic bodies, as finely pulverized glass or pumice,¶ in order to render the combination more resistant to abrasion; but, as may be supposed, such additions proved to be worse than useless for the purpose, being non-contractile, and destroying the homogeneity of the amalgam; and they were very soon cast aside.

From time to time in the history of amalgam, metals other than those named have been used in its composition. As some of these have been entirely discarded, and others are still undergoing experiment, and also because the manufacture of the article has latterly become, like gold foil, confined to special fabricators, it is not deemed necessary to pursue this part of the subject.

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* American Journal of Dental Science, 1st Series, vol. x. p. 142.

† Transactions of the New York Odontological Society, 1874, p. 81.

‡ Dental Cosmos, vol. iv. p. 356, note.

§ Dental News Letter, vol. ix. p. 40.

|| Dental Cosmos, vol. iv. p. 858.

¶ Harris's Dictionary of Dental Science. p. 33

The Amalgam War.—The introduction of amalgam to this country is noted as follows by Dr. C. A. Harris, in the opening address to the first class of the Baltimore College of Dental Surgery, 1840:*

"More recently an amalgam of mercury and silver has been highly extolled by a few practitioners, both in this and other countries; but by most of those who have had teeth filled with it, bitterly denounced, —so that . . . . it has nearly gone into disuse. It is certainly one of the most objectionable articles for filling teeth that can be employed, and yet, from the wonderful virtues ascribed to this pernicious compound by those who used it, thousands were induced to try its efficacy."

At the very first appearance of this filling material in this country (in 1833), there arose a most violent and determined opposition to it, on the part of the best men in the profession. In view of the particular circumstances attending its *début*, it is not, perhaps, singular that it should have been opposed. Two adventurers, without skill or experience, or any claim to the title of *dentist*, suddenly appeared in New York and began dental practice amid such a shower of advertisements, a profusion of display, and a metaphorical flourish of trumpets as caused our staid and dignified dental ancestry to bound with surprise and indignation. Even had the Crawcours practiced in the ordinary manner, and with the then common materials, there is little doubt that such an unprecedented method of introduction would have quite as surely aroused the opposition of respectable practitioners, on grounds of unprofessional conduct; and when to this charge was added the enormity of having introduced, and of using, solely, a new filling material *containing mercury*, the exasperation of the better class of dentists was raised to the highest pitch.

Again, had the practice of the Crawcours been of little value, pecuniarily, there is reason to believe that their opponents would have contented themselves with simply discountenancing the efforts of the empirics, as they had uniformly done in the cases of others of the class; in which case the "amalgam war" would never have been. But, on the contrary, the offices of the quacks were soon thronged with the best patients of the foremost dentists. The gold plugs of Parmly, Baker, and Greenwood, were suddenly no longer in demand, for the "Royal Mineral Succedaneum" had displaced† them. Our grandfathers and grandmothers naturally preferred a few moments' reclining in a luxurious easy-chair and the gentle insinuation of a plastic material to the tiresome and painful operation necessary to the introduction of a gold filling. Liveried attendants heeded their slightest wants; the principals themselves were polite even to adulation; and everything was artfully calculated to make the operations matters of pleasure rather than of pain and endurance.

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* American Journal of Dental Science, 1st Series, vol. i. p. 202.

† In some cases *literally*. See Spooner's "Guide to Sound Teeth," p. 122, note.

To combat such a foe, no ordinary means of offense were to be thought of; only the promptest and most vigorous measures seemed admissible; and no time was lost in initiating and carrying out such measures. Everywhere the empirics were denounced, their modes of practice severely criticised, and their material especially roughly handled. Mercurial salivation as a result of the Crawcours' operations was not only hinted at, but openly and firmly insisted on; and was, moreover, as firmly believed in by the most scientific and best educated dentists of the day. In short, a relentless crusade was begun against the "foreign quacks." Such an attack, participated in, as it was, by almost every principal dentist, not only in New York but in the country, was tremendous; and its disastrous effects were greatly increased by the bad results of the operations performed by those attacked. Their methods seem to have been totally devoid of the elements of success. Cavities were never excavated or even dried, the stopping being quickly thrust into its place and smoothed off. In many instances where there were *no* cavities, amalgam had been stuffed *between the teeth*. The material itself seems to have been very carelessly or ignorantly prepared, a large excess of mercury often remaining after introduction; which not only prevented hardening, but was even *squeezed out into the mouth* during mastication! The impostors might have successfully resisted the advance of all their professional opponents; but the additional onslaught of the victims of their charlatanry quickly produced defeat; and they "were compelled to fly with their ill-gotten gain and blasted reputation (?) for refuge to another land."*

With the departure of the Crawcours it was supposed that the use of their material would cease; but such was not the fact. Amalgam possessed too many advantages of manipulation to be lightly discarded, especially for the cheaper class of operations, and by the lower grades of operators; though its use was not by any means confined to these, for several men of excellent public and professional reputation had begun to use it. Hence the opposition to the Crawcours was transferred to the amalgam they had left behind them.

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* American Journal of Dental Science, 1st Series, vol. i. p. 208.

It is extremely difficult, at this time, to indicate exactly the ratio of prejudice to actual knowledge of bad effects, in the opposition to this material; but it may be safely stated that prejudice constituted the largest factor in the problem. In saying this, we do not wish to be understood as disparaging the scientific knowledge of the opponents of amalgam. There were, it is true, many statements made, and conclusions arrived at by them, which appear, at present, inexplicable in any light furnished by reason or the true and liberal spirit of scientific research; but there may have been attendant circumstances which, if now known, would modify our judgment of these matters. Nevertheless, experience has since proved the falsity of many of the alleged mischievous results attending the use of amalgam, and has explained in quite a different manner such results.

A further and powerful argument in support of the view we have taken may be found in the fact that experiment with the material was very slightly (when at all) conducted by its adversaries. The most zealous of these even claimed (and as a merit, too) that they had "never touched amalgam." However the opposition of such antagonists may have then been regarded, it would certainly, at this day, receive very little attention; being in direct violation of the maxim, "Prove all things, hold fast that which is good."

As was to be expected, the long-continued opposition to amalgam as a material resulted in the production for it of defenders. At first this defense was passive, consisting in simple non-acceptance of the conclusions arrived at and the opinions held by the opposition; but such inactivity was soon roused into open resistance; and that, too, on the part of many who stood high in the profession. Before the existence of dental societies the disputes thus engendered could, necessarily, take the character of only personal differences; which were none the less pronounced and bitter from the absence of any authority to be attached to them, and which, in common with such controversies in general, possessed a very considerable share of the element of permanence. Hence it was, that the first official acts of the earlier societies were in the direction of the "amalgam question."

Of the minor quarrels and bickerings, both in and out of societies, to which this question gave birth, it will be useless (and, indeed, impossible) to speak. Their name is legion. We pass on to that action of the American Society of Dental Surgeons which formally inaugurated the "*amalgam war.*"

The first official act in the matter was the appointment (1841) of a committee by the above Society, to report on the use of "'lithodeon,' 'mineral paste,' and all other substances of which mercury is an ingredient for stopping teeth." This committee "reported in substance that the use of all such articles was hurtful, both to the teeth and every part of the mouth, and that there was no tooth in which caries in it could be arrested, and the organ rendered serviceable by being filled, in which gold could not be employed."* This report was adopted unanimously.

It will be well to note the names of the members of this committee. They were, Eleazer Parmly, Elisha Baker, Solyman Brown, Chapin A. Harris, and Jahial Parmly.

At a meeting of the same Society, July 20th, 1843, on a motion made by Dr. C. A. Harris, the use of amalgam was declared to be malpractice, and a committee consisting of Drs. S. Brown, E. Parmly, and J. H. Foster was appointed "to receive information and facts on that subject, to be transmitted to Dr. Westcott, of Syracuse, New York, to be by him laid before the Medical Society of the County of Onondaga, of that State, before which the subject aforesaid is now pending."†

The report of the medical committee was somewhat non-committal. One quotation, the summing-up, may be made to show this: "That the mineral paste has produced, in many instances, the peculiar effects of mercury, though in different degrees of intensity, in some slight, in others severe and alarming, there can be no doubt. The committee believe that the proportion of such cases is small compared with the whole number operated upon, but that no care in the *combination* or *use* of the paste will prevent its occasional bad effects."

In August, 1845, at the organization of the Mississippi Valley Association of Dental Surgeons, the following resolution was unanimously passed: "*Resolved*, That we consider the use of all mineral paste, or other paste, in the plugging of teeth, as unprofessional and highly injurious, and that we will neither use it, nor countenance its use by others."‡ From this it will be inferred, not only that the use of the "paste" was continued,—despite the assertion of Dr. Harris to the contrary in 1840,—but that it was assuming even alarming proportions. In fact, many of the best dentists began to use amalgam; and it was asserted, and with some color of probability, that there were "instances where individuals have been active in expressing, publicly, their disapprobation of the use of the mercurial cement, even voted on resolutions against it before a body of scientific gentlemen, and yet are secretly in the habit of using it."[*]

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* American Journal of Dental Science, 1st Series, vol. ii. p. 188.

† Ibid., vol. iv. p. 70.

‡ Ibid., vol. vi. p. 47.

The employment of amalgam was fast passing from bad to good hands. Many good operators did not scruple to use it openly, and many others, equally good, while making no parade of it, yet used it to a considerable extent. Its antagonists began to feel that the crisis was upon them, and that, unless decisive action was taken, they were undone. Accordingly, the American Society of Dental Surgeons, at its annual meeting, New York, August 5th, 1845, on motion of Dr. John B. Rich, adopted the following resolution: "*Resolved*, That a committee of investigation be appointed; such committee to consist of five members of this association, to be nominated by the chair. The duty of the committee, so appointed, shall be to call upon each of the members *now* in this city, with the view to ascertain from each member whether he has used any amalgam in the course of his practice as a dental surgeon, or approves of its use; and if he has used it, whether he has done so within the last twelve months. *And it is further resolved*, That the said committee of five be particularly requested to obtain, if possible, a direct answer on this subject, from each and every member so called upon."[†] The members of this committee were Drs. J. B. Rich, J. Taylor, J. Allen, E. J. Dunning, and Alex. Nelson.

This resolution was not adopted without much debate. The right of the Society to call upon its members for an exposition of their practice was severely questioned; and, also, the Society was no longer a unit on the subject of the use of amalgam. Its use was declared to be "occasionally admissible" by several members;[‡] chief among whom was Dr. E. Baker, whose name we have before seen as one of the committee who reported that the "use of all such articles was hurtful," etc., but who now "contended that in 'certain cases' it could be judiciously employed."[§] Dr. Solyman Brown, also, "questioned the right of the Society to demand of its members their private practice, and contended that 'no one ought to be required to pledge himself not to use any article, as his *conscience* might demand that he should use it.'"[||]

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[*] American Journal of Dental Science, 1st Series, vol. v. p. 277.

[†] Ibid., vol. vi. p. 74.

[‡] Ibid., p. 75.

[§] Ibid.

[||] Ibid.

The inquisitorial committee declared in their report that, out of twenty-five members of the Society resident in New York and Brooklyn, two were absent, two not in practice, ten disapproved entirely of amalgam, five had employed it, but were willing to discontinue that employment if required,—and six used it under certain circumstances and refused to pledge themselves not to do so. Three of these, however, subsequently advised the Society that they should discontinue its employment.* Of twenty-one non-resident members then present, all condemned the material.† Whereupon a committee of five was appointed to devise a plan of action for the Society in the matter. This committee consisted of Drs. Hullihen, J. Taylor, E. Noyes, J. B. Rich, and C. A. Harris. Their report, after insisting that any amalgam, whatever its designation, was unfit and dangerous for use as a filling, concluded as follows,—"That any member of this Society who shall hereafter refuse to sign a certificate pledging himself not to use any amalgam, and, moreover, protesting against its use, under any circumstances, in dental practice, shall be expelled from this Society."‡ An amendment also provided that the recording secretary should notify all members of these resolutions, and forward to each a printed pledge or certificate as provided for in the committee's report, to be signed and returned within sixty days of the date of its issue, under penalty of the recipients being dropped from the rolls if recalcitrant.§

The Society also, at this meeting, sent a circular letter to the periodicals of the country, condemning amalgam in the strongest terms, and advising the public of the foregoing resolutions.‖ They further resolved to constitute the Society "a vigilance committee, to report all cases of malpractice which may come to the knowledge of any of its members."¶

This arbitrary action of the Society was received, not only by the expelled members but by many non-society dentists, with great indignation. The right of the Society to take compulsory action was stoutly denied; and the "pledge," when it finally reached the members, served only to increase the storm. The Virginia Society of Surgeon Dentists, at their meeting in October, 1845, while passing a resolution strongly condemnatory of amalgam, yet concluded by saying,—"That while we reprobate the *use* of all such mercurial preparations, and will execute our laws with fidelity and promptness, we claim no authority over the opinions of our members, nor will we ever require of them other pledges than those which exist among *honorable men*, united for the purpose of improving and elevating a noble science."* The debates on this resolution took the general tone of a declaration that "the Society was not a court of conscience; that they had no right to demand any expression of opinions, or to require any pledge in relation to the use of mercurial cements; that the Society having declared their use *malpractice*, the only course to pursue was to arraign an accused member, and, upon conviction, execute the law. To expel for refusing to express an opinion or to give a pledge was making the *refusal* malpractice under the law, which was nonsensical and absurd. It was also contended that to require action under a threat was a course of procedure to which no honorable man would submit."† These opinions are typical of the arguments and feelings of the protestants against the American Society's action.

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* American Journal of Dental Science, 1st Series, vol. vi. p. 76.

† Ibid., p. 247, note.

‡ Ibid., p. 80.

§ Ibid., p. 81.

‖ Ibid., p. 82.

¶ Ibid., p. 84.

On the part of the Society's supporters it was contended that the evil of the employment of amalgam had become "a crying one, and was rapidly spreading. . . . At three successive meetings the Society had passed resolutions declaring its use for dental purposes malpractice; but, notwithstanding this, many of the members continued to use it. It was therefore imperative on the part of the Society to adopt some strong measures to repel the imputation which was thus crippling its energies and weakening its power to do good. The arraignment and expulsion of one or a dozen of its members would not have corrected the evil, so long as others, against whom positive proof of the fact was wanting, were charged with using the article. To prevent such charges, and at once to free itself from all who persisted in this empirical practice, it had adopted the resolutions of examination and expulsion."‡

Of the membership (134) of the Society, seventy-six complied with the resolutions, either in the letter, by signing within the allotted time, or in spirit, by stating their willingness to do so; and fifty-eight failed to comply with the requirements, either by direct refusal (3), by not having received the notice (2), or by disregarding it entirely (53).§ The forbearance of the recording secretary saved these latter from expulsion; and the Society, seeing so large a minority in the opposition, decided to mitigate the severity of the resolutions by abrogating that part of them which related to the limits of time for acquiescence in their demands. This recession, however, served only to increase the vigor of the opposition, and in the next meeting, at Saratoga, 1847, resolutions were passed declaring that "this Society will not expel any member who is not in the practice of using or recommending the use of amalgam for filling teeth."* This resolution disposed of the cases of all those who did not use the article, but had refused to sign the pledge. The remainder of the protestants, who did not scruple to employ amalgam, when necessary, in their practice, were then expelled, according to the previous resolutions; for not to have done so would have been, in effect, acknowledging that "the mandate" was wrongfully issued. Eleven members were expelled, the resignation of one accepted, and four cases laid over until the next annual meeting, in 1848,† at which time four more resignations were accepted, and the cases laid over the year before were again extended.‡

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* American Journal of Dental Science, 1st Series, vol. vi. p. 160.

† Ibid. ‡ Ibid., p. 168.

§ Ibid., vol. vii. pp. 91, 92.

The Society had now done all in its power to prevent the use of the reprobated material; but that use, instead of being stopped, or even lessened, was steadily increasing. Intelligent and earnest men experimented with it, instead of depending on the statements and opinions of others, and amalgam at length obtained, in great measure, what it had never yet arrived at,—a fair trial. Under this condition of things there could be but one result. The material withstood the tests applied, in the opinion of the majority, and it at length became a necessity for the American Society of Dental Surgeons to take some retrograde action in the premises. Many of its members were in favor of the Society's openly acknowledging the mistake it had committed, and thus place itself again on a firm footing in the respect and esteem of the profession; but others were either unwilling to retreat so entirely from the position they had before taken, or thought that no mistake had been made. The schism ended in the passage, August 13th, 1850, of the following resolution, which was introduced by a committee previously appointed to report on the propriety of rescinding the "amalgam pledge" resolutions: "*Resolved*, That the several resolutions adopted by the American Society of Dental Surgeons, at the annual meeting held 1845 and 1846, having the effect of enforcing the subscription to the protest and pledge against the use of amalgam and mineral paste fillings for teeth, be, and the same are, hereby rescinded and repealed."[*]

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* American Journal of Dental Science, 1st Series, vol. viii.

† Ibid. ‡ Ibid., vol. i

As this repeal was not accompanied by an avowal of any former error, and as it was professedly "based upon the belief that the resolutions had accomplished the object for which they were designed, and there no longer existed any necessity for their enforcement,"[†] Dr. John B. Rich, having become convinced that the former action of the Society in the matter was wrong, tendered his resignation, which was accepted.[‡]

Thus ended the official character of the "amalgam war." That the opponents of amalgam acted unwisely and precipitately, and without due regard to the proper principles of scientific inquiry and research, few will at present deny. Instead of decreasing the estimation in which amalgam had been held, their action increased it, by leading men to experiment with the material in order to ascertain the truth or prove the falsity of the charges made against it. Other consequences of their folly will be noticed in treating of the American Society of Dental Surgeons, as such.

But the opposition to amalgam, although authoritatively nearly at an end, still retained all the acrimony of its former personal status. Eleazer Parmly was the most prominent in these assaults, which he continued with unabated vigor for many years. The character of his enmity, and, in fact, that of much of the whole antagonism to amalgam, may be inferred from a statement which he made when interrogated as to his practical knowledge of the material: "I have neither used nor experimented with it in any way. I would not touch the nasty stuff!"[§]

No history of the profession would be complete without the story of the "amalgam war." While the acrimonious contest is now of interest only as connected with the past, the presentation of new formulæ and the testing of their value in the present leaves the question of the employment of this material only a subject of amicable discussion and scientific study.

Gutta-percha.—This substance came into use as a material for temporary fillings in 1847–8,[‖] and was very well received. Its use soon became almost universal. Dr. Wood says of it,* "Few substances have in so short a time acquired more importance in our profession than this." As the methods of employment were substantially the same upon its introduction as they are at present, and as the nature of the material has not been varied, further treatment of this subject will be needless.

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[*] American Journal of Dental Science, 2d Series, vol. i. p. 92.

[†] Ibid., p. 100.

[‡] Transactions of the New York Odontological Society for 1874, p. 61, *et seq.*

[§] Dr. John B. Rich, in Transactions of the New York Odontological Society for 1874, p. 64.

[‖] Dental Cosmos, vol. viii. p. 658.

Hill's Stopping was introduced in the early part of 1848, and patented in 1849. This was an attempt to render gutta-percha as available for permanent, as it had proved itself for temporary, purposes. It was simply a compound of gutta-percha with quicklime and powdered quartz and feldspar, which might be varied "slightly in hardness by adding the filings of any of the metals used in filling teeth,"† and to which coloring substances might be added. When first introduced, and when prepared according to the patent specification, it was not of much value;‡ but it was subsequently improved, being prepared (as is supposed) after another and secret formula,§ and obtained very considerable employment, which continues to the present.

Other preparations of gutta-percha with additional substances for filling purposes, such as Bevins's stopping, etc., have been introduced, from time to time, and have each served more or less successfully the needs of the dentist; but as they are constituted and manipulated on the same general plan as the compound of Dr. Hill, further notice of them will not be attempted.

Oxychloride of Zinc.—This term was at first applied to the chemical compound it indicates; but has become almost the generic name of a certain class of filling compounds which vary considerably in materials and composition. "It had its origin in an invention of M. Sorel for stone-work . . . . 1856, consisting in a coating of oxide of zinc overlaid with a coating of chloride of zinc."‖ The inventor suggested its employment "to stop hollow teeth, for which its plasticity and subsequent impenetrability to the moisture of the mouth render it particularly applicable."¶ This "Sorel cement," the first of the oxychlorides, was used to some extent, but was supplanted by other nearly similar combinations.

The specific compounds have received many appellations, as *osteoplastic*, *crystal cement*, [illegible], [illegible], [illegible], *plastic bone*, etc., according to the several variations or the fancy of the manufacturers. Their compositions are generally held secret; but it is certain that the whole are founded on one general base.

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* Dental Cosmos, vol. i, p. 83.

† American Journal of Dental Science, 3d Series, vol. [illegible], p. 427.

‡ Dental Cosmos, vol. [illegible], p. 8[illegible]. § Ibid.

‖ Ibid., p. 538. ¶ Ibid.

For a number of years after its introduction, the oxychloride class of fillings was somewhat cautiously handled, and seemed to make its way very slowly; but of late years its employment has become more extended, and it now has a place in almost all operating-rooms. It has never, however, attained very great importance for permanent fillings; although (as may be said of almost every filling material) it has so served in many instances. Its real value lies in its applicability to such cases as call for what may be termed "semi-permanent" stoppings; here it has proved of very considerable value, and is largely used for such purposes.

TREATMENT OF THE DENTAL PULP.

This subject has been a prominent one in dentistry from very early times; but the first practice in this regard was quite simple, and, like the materia medica of the day, confined within very narrow limits. From the absence of detail in any accounts of early operations which we now possess as regards American dentistry, a résumé of the processes of that period must be largely inferred from the practice of contemporaneous foreign writers. As the knowledge of the science was gained, however, and when once out of the shadow of secrecy in operations, the profession in this country came to have ways peculiarly its own for the management of cases of diseased or exposed pulps; and from that time the data regarding new remedies and processes are so numerous and conflicting as to cause much more trouble through difficulty of selection than from paucity of material.

The earliest detailed account of the treatment of exposed dental pulps which is contemporaneous with dentistry in this country, occurs in the work of Robert Woofendale ("Practical Observations on the Human Teeth"), published in London, 1783. Mr. Woofendale returned to this country in 1795,* and from thence resided with us, part of the time in the practice of dentistry, until his death in 1828; therefore his methods were very probably known and practiced here, at least soon after his second coming among us. Some extracts from his book will be of interest.

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* This is the Mr. Woofendale noticed in the introduction as having been in America from 1766 to 1768.

"Of the *common* toothache. This kind of toothache is simply the exposed nerve of the tooth, which gives pain on the pressure of food in mastication, on its being touched with any hard substance, the application of anything hot or cold, or the pressure of the atmosphere. . . . When the nerve is exposed, a small bit of lint, dipped in the oil of *cinnamon*, *cloves*, *turpentine*, or any *chemical* oil, frequently gives relief, and if repeated for some time, often destroys the nerve. I have known good effects from the application of half a grain of crude opium, rubbed with a few drops of common water to the consistence of a bolus, with the addition of half a grain of camphor brought to the same consistence, introduced into the hollow part of the tooth with a small portion of lint, and repeated daily for eight or ten days. . . . This kind of toothache is sometimes cured by cauterizing the ear. . . . Destroying the exposed nerve of a tooth by the actual cautery is an operation I have sometimes performed with success, and many times without any."

Benjamin James, in "A Treatise on the Management of the Teeth," published in Boston in 1814, recommends, in addition to the opium and camphor of Woofendale, a drop of either laudanum, oil of mint, or oil of cajeput, placed in the hollow of the tooth.

Josiah Foster Flagg, in 1822, published a work entitled "The Family Dentist," in which, speaking of exposed pulps, and after recommending oil of cloves or of cajeput, he says, "they are also sometimes destroyed by the dentist . . . . by the use of strong mineral acids, or by instruments designed for this purpose."

Koecker, 1826, recommends* attention to diet, and the actual cautery, and stimulates externally with myrrh, camphor, and opium, to reduce inflammation of the gums. This author was the first to introduce the operation of "capping," which will be noticed presently.

Dr. S. S. Fitch, in 1829,† used astringents, as alum, borax, and galls, the application to be renewed every ten or fifteen days for several weeks, or even months. He mentions caustic potash as a nerve-destroying agent which had then been used.

In a small work on the "Economy of the Teeth and Gums," published in London, in 1831, the author (anonymous) mentions some of the practices then in vogue, which belong as well to the American as to the foreign dentistry of the time. He speaks of the application of "tinctures and essential oils, upon cotton, as tincture of benjamin, oil of marjoram, rosemary, and the like, or pills made of camphor and opium, or chewing the acrid root of the pellitory of Spain. Some destroy the nerve with sulphuric or nitr*ous*(?) acid, or a hot iron, or touch the antehelix or posterior eminence of the ear with the latter." He recommends pills of extract of belladonna and powdered liquorice-root to be placed in the cavity over the nerve, and allowed to dissolve.

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* Principles of Dental Surgery,

† Dental Surgery, New York, 18

We now come to an important year in pulp-treatment, 1836. In this year Dr. Shearjashub Spooner gave to the world in his book, "Guide to Sound Teeth," etc., the use of the agent *arsenious acid* for the destroying of tooth-pulps. This practice originated with his brother, J. R. Spooner, of Montreal. Dr. Spooner (Shearjashub) says of it, "The nerves of the teeth may be certainly and effectually destroyed, with little or no pain to the patient, and without the least danger, by means of a little arsenious acid applied to the nerve." Also, "So complete and satisfactory is the operation of the arsenic in destroying the living fibre, that, instead of extracting teeth whenever the nerve is badly exposed, we destroy it, plug the teeth, and thus preserve them." Dr. Spooner employed a mixture of three parts arsenious acid and one part acetate of morphia. He says, "the twentieth of a grain (of arsenic) is quite enough to destroy the nerve of any tooth."

He also mentions nitric acid and nitrate of silver as old remedies, and adds, referring to actual cautery, "A hot wire is the remains of barbarism . . . . and does not become the present enlightened day."

Chapin A. Harris, in 1839,* recommended the application of leeches to the gum, and soothing and astringent applications to the cavity. He also gives the following formula for application to the pulp, directing it to be introduced on raw cotton and reapplied every day: "Sul. ether, ℥i; creasote, ʒss; ext. nutgalls, ʒi; g. camph., ʒss." He adds to the list of these practiced methods, beside those already noted, the use of the *drill*, and muriatic acid. With regard to the then new employment of arsenic, he remarks that, "The fact that this article is a most deadly poison . . . . will preclude its use from ever becoming very general." And he names "for the destruction of the nerve in teeth which have but one fang," the use of the drill "as far superior to anything that has been heretofore proposed."

James Robinson, writing in 1846,† speaks of terchloride of carbon, a paste of morphia and creasote with gum-mastic, chloride of zinc, and tannin (tannic acid?) as being in use at that date.

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* The Dental Art; a Practical Treatise on Dental Surgery, Baltimore, 1839.

† The Surgical, Mechanical, and Medical Treatment of the Teeth, London, 1846.

Since the last-mentioned date the list of substances for application to exposed pulps has very considerably increased, so much so that only the most prominent of them can be noticed, and that without any reference to their parentage in dentistry, or exact statement of the order of their appearance.

Carbolic acid was discovered in 1834, by Runge, and thoroughly investigated in 1841, by Laurent; but it was not until long afterward that it was adopted into medicine. The first published notice of it, as connected with dentistry, which we have been able to procure, is that by Dr. Geo. T. Barker, in the fourth volume of the *Dental Cosmos*, 1862, p. 189. In this year a small quantity was imported by Dr. Edward Parrish, and used in supersedure of creasote by Dr. Barker, who spoke highly of it. Its employment has since become very general, and it has proved itself to be a valuable acquisition to dentistry.

Thymol is a substance of comparatively recent introduction, having been imported and used about 1874 by Dr. A. L. Northrop. Carvacrol was introduced about the same time by Dr. H. L. Sage. Salicylic acid is still newer in dentistry, but has already obtained quite an extended employment. Benzoic acid, the latest substance advocated for pulp-treatment, is still under experimentation.

The above account is believed to embody the principal substances which have been used in the therapeutic treatment of exposed pulps. The next class of operations to be considered will be mainly mechanical.

The first of these, in the order of time, was extirpation by steel, of which process Hudson is believed to be the originator in this country. This method was also largely employed by other distinguished operators, who used broaches, barbed or not, as the occasion required, but is now rarely practiced.

Capping or covering an exposed pulp was practiced by D. C. Ambler and others, as early as 1827, but was published to the profession by Koecker, who describes it fully in his work (already cited). He used for the purpose a plate of lead, alleging as the reason for the selection of this metal, that it had a cooling and anti-inflammatory effect on the pulp-substance. If the pulp was wounded, he applied actual cautery, placing the cap over the eschar thus formed, and filling the cavity with gold.

Upon the publication of Koecker's me ally tested and received with favor. Other substances for caps were tried. Fitch used gold caps. Hullihen performed the very delicate operation of inserting a cap formed of gold wire wound into a flat, conical spiral, in connection with another operation soon to be noticed. Dr. Harris used no cap, but arched his filling over the pulp. Asbestos, from its softness and non-conductibility of changes of temperature, was early and considerably used as a capping or floor for the filling, being prepared with gums or collodion, or rolled in gold foil. Gutta-percha (Hill's stopping), silk, charcoal, paper, quill, tortoise-shell, and horn were experimented with. Dr. N. C. Keep introduced oxychloride of zinc, which, through the advocacy of Dr. Wm. H. Atkinson and others, has obtained a more extended use than any other material for this purpose.

Several of these substances and processes have received much attention from, and become quite extensively employed by, the general profession. Asbestos was once very considerably used, but is no longer so. Gutta-percha and oxychloride of zinc are, perhaps, in more general use at present than any other materials for this purpose.

In 1851, Dr. S. P. Hullihen introduced an operation at once so delicate and scientific that it was immediately incorporated in dental practice, and has ever since been known by his name. This operation consisted in "making a hole through the gum, the outer edge of the alveolar process, and the root of the tooth into the nerve-cavity, and then in opening the blood-vessels of the nerve."* Dr. Hullihen had first practiced this operation in 1845.

Drilling into pulp-cavities was not new; for this had been practiced by Hunter and Fox. But they did it to allow the escape of pus; while Hullihen's operation was intended *to deplete a congested pulp* and allow its preservation.

Priority in this operation was disputed by Dr. S. P. Miller; but as Dr. Miller drilled through the root in order to *divide the pulp*, his operation cannot be called identical with that of Hullihen, which was intended to *preserve* the pulp, not to destroy it. A method more nearly akin to Miller's is that of Fattori (published in Maury's "Dental Surgery," 1843, p. 166), which was, piercing the gum and alveolus in such a direction as to "divide the dental nerve at the point where it enters the tooth."

The "Hullihen operation," or *rhizodontrypy*, though widely known and esteemed, is rarely practiced, owing to the great skill, care, and experience required for its successful performance.

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* American Journal of Dental Science, 2d Series, vol. iii. p. 160.

Another operation, of very considerable excellence and based on correct surgical principles, is that proposed and performed by Dr. Allport, of Chicago. The object of this operation is to reduce the bulk of the pulp, when exposed, previous to capping. It consists in excising a portion of the pulp and bringing the edges of the wound into close apposition, so as to obtain healing by first intention. It is open to the same objections as the operation of Dr. Hullihen,—objections which are, contrary to the rule, honorable in both cases to the devisers of the methods in question.

In all methods of capping, the ultimate design is now to secure the production of secondary dentine at the exposed point of the pulp. This object is not apparent in the earlier operations, but was distinctly claimed as the final aim by Dr. W. W. Codman, of Boston, in an article published in the *Boston Medical and Surgical Journal*, in 1850; since which time this end has been steadily held in view by those who have attempted the operation of capping.

A system of treatment of teeth with endangered but not exposed pulps was practiced as early as 1846, and, more recently, has been the subject of much careful investigation and practice.

ANÆSTHETICS.

Strictly speaking, this term denotes those substances which produce insensibility to pain, and therefore includes all pain-obtunders. But the word has come to imply only such agents as are inhaled in the form of "vapors or gases and pass with the blood to the nervous centres on which their action is exerted."[*] Therefore, any other than these forms of anæsthetic agents will be treated under the head "*Materia Medica*," with the exception of that process denominated "local anæsthesia," which cannot be thus classified; therefore, from its not being of sufficient importance to demand a chapter by itself, it also is inserted under the present heading.

The principal anæsthetics which are employed are nitrous oxide gas and the vapors of the ether[†] and chloroform. To these may be added, as late discoveries, bichloride of methylene and tetrachloride of

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[*] Dunglison.

[†] It has seemed proper [illegible] designations given to varieties of this substance, as [illegible]

carbon. All of these have received a more or less extended employment in dentistry, and the world owes the practical application of the anæsthetic effects of the first two to dental practitioners.

Considered in the order of their introduction as pain-destroying agents, the first to be treated of is—

Nitrous Oxide, or *Protoxide of Nitrogen*.—This gas, as such, was discovered by Priestley in 1776. Its exhilarant and anæsthetic properties were first noticed in 1800 by Sir Humphrey Davy, who, however, appears not to have been aware of the great value of that property to surgery, for he did no more than suggest that, "as nitrous oxide in its extensive operations appears capable of destroying physical pain, it may probably be used with advantage during surgical operations in which no great effusion of blood takes place."* The savants of the whole time between 1800 and 1844 appear to have been equally regardless of that value; for, although nitrous oxide continued to be exhibited, experimentally and as a diversion, throughout the civilized world during that time, not one of them made any practical application of its most important property.

On the evening of December 10th, 1844, Dr. Horace Wells, a practicing dentist of Hartford, Conn., attended in that city a chemical lecture by Mr. G. Q. Colton, during or after which the lecturer administered to Mr. Samuel A. Cooley, and others, the nitrous oxide gas. Mr. Cooley, on being brought under its influence, became unusually excited, and, during his consequent activity, sustained severe bruises; of which fact he was unconscious until after recovery from the effects of the gas. His asseverations of want of knowledge of any pain, while in the unconscious condition, took strong hold on the mind of Dr. Wells, and he immediately expressed his belief that teeth could be painlessly extracted during the inhalation of this agent. So strongly was he thus impressed, that the next day he requested Mr. Colton to provide some of the gas for him, which he took himself, holding the bag in his lap, and, while under its influence, underwent the extraction of a molar tooth at the hands of Dr. John M. Riggs, a fellow-dentist of Hartford. Upon his recovery, Wells exclaimed, in high glee, "*A new era in tooth-pulling!*" The exclamation was prophetic.

So elated were Drs. Wells and Riggs at the success of their experiment that they immediately turned their attention to the extraction of teeth by the aid of this agent, and continued to devote themselves, in conjunction, to this subject for several weeks almost exclusively.

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* Davy's Chemical and Philosophical Researches, p. 556.

[illegible] anesthesia [illegible] published statements [illegible] Wm. M. Cornell,* [illegible] M. Miles,† and C. A. Tarr.‡

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* [illegible] May 21st, 1864.

† [illegible]

‡ [illegible] sia, p. 94.

While in Boston, at this time, and previous to his experiment at the Harvard school, Dr. Wells called on Dr. Charles T. Jackson and Dr. Wm. T. G. Morton, the latter an old pupil and partner of his, and *communicated his discovery to them.* This, it will be remembered, occurred in December, 1844. These gentlemen "expressed themselves in the disbelief that surgical operations could be performed without pain, both admitting that the *modus operandi* was entirely new to them."* The fact of this visit, at the date and for the purposes alleged, is admitted by Morton in his subsequent memoir to the French Academy of Arts and Sciences on the subject of the discovery of the anæsthetic effects of sulphuric ether.

After the discovery was made, Wells had frequent interviews with Morton on the subject, and the latter requested instructions in the preparation of the gas, as he wished to try it in Boston. Probably aware of the danger, to a non-chemist, of preparing ni*tric* oxide in place of ni*trous* oxide, Wells advised Morton to go to Dr. Jackson, in Boston, who was a chemist and could prepare the gas properly. This fact is susceptible of abundant proof.

Although nitrous oxide, in Wells's hands, had been successful in its operations, yet the facts of its bulk and difficulty of preparation were objections to its use which he early endeavored to obviate. Any experiments to this end would naturally first take the direction of efforts to replace the objectionable material by one less so. Such an one was thought of in the substance *sulphuric ether.* This article had long been known in chemistry as producing effects generally similar to those of nitrous oxide, and Wells accordingly gave it several trials, one in 1845, and one in 1848, but then decided not to use it. The circumstances of the last case are made apparent in the following extract of a deposition made by Bishop Brownell, the person mentioned being his daughter. "A few weeks afterward† she had three more teeth extracted while under the influence of ether, and with little appearance of suffering, though she thought it less genial in its effects than the nitrous oxide gas, ..."‡ In 1845 ether was administered by Wells to John G. Wells, who said of it, "The ether was unpleasant in its effects, though the tooth was extracted without pain. I therefore advised my friends not to use it, but rather the exhilarating gas."* This trial of ether by Wells was in consequence of a previous experiment with this agent, in 1844, thus related by E. E. Marcy, M.D.:

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* Pamphlet published by Dr. Wells in 1847. *Also*, Modern Anæsthesia, by man Smith, p. 57.

another extraction while under the effects of nitrous oxide.

Anæsthesia, p. 67.

"Knowing that the inhalation of sulphuric ether vapor produced similar effects to those of the gas, . . . I suggested to Dr. Wells its employment, telling him at the same time that I would prepare some ether and furnish him with some of it to administer, and also make a trial of it myself, in a surgical case which I expected to have in a few days. This conversation took place in Dr. Wells's office at the time the tooth was extracted from Mr. Goodrich (December, 1844). Accordingly, within two or three days after that event I administered the vapor of rectified sulphuric ether in my office to the person alluded to in my conversation with Dr. Wells, ... and cut from his head an encysted tumor of about the size of an English walnut. Dr. Wells came in during the operation, and sufficiently early to form an opinion upon the subject. It was entirely successful, and conclusively proved to Dr. Wells and myself the anæsthetic properties of ether vapor."†

Sufficient seems to have been here advanced to prove the following positions:

That Horace Wells successfully produced anæsthesia with nitrous oxide, and performed operations on subjects placed in that condition, as early as September, 1844.

That he publicly exhibited the anæsthetic effects of that agent, and that these effects were generally known in Hartford, and among the medical profession in Boston, in the latter part of the same year.

That, among others at this time, Drs. C. T. Jackson and Wm. T. G. Morton were informed, and one at least (Morton) knew personally of such effects.

That anæsthesia by nitrous oxide continued to be produced, from the time of its discovery until almost the day of his death, by Dr. Wells.

That ether was used by Wells personally, for producing anæsthesia, in 1845.

These points will be again referred to in the further examination of this subject.

Ether.—On the 30th of September, 1846, Wm. T. G. Morton (to whom we have already referred) called on Dr. C. T. Jackson, "with an india-rubber bag in his hands;" as to the proposed use of which, when questioned by Dr. Jackson, he answered evasively. "There was then some conversation about the use of exhilarating gas. . . . Morton asked Jackson if he (Morton) could make it. Jackson told him he could not succeed without apparatus, . . . and that if he undertook to make it he would get ni*tric* oxide instead of ni*trous* oxide. Morton asked Dr. Jackson if he would not prepare some for him. This Dr. Jackson declined, on account of his business. . . . As he (Morton) was going, Dr. Jackson told him that he could tell him something that would make his patients insensible. Morton asked him what it was. Dr. Jackson told him to go to Burnett's and get some pure sulphuric ether and pour it on a handkerchief, and put it to the patient's mouth and let her inhale it. . . . From Morton's questions about the ether, I am satisfied he knew nothing about its properties or nature. . . . The next day after the above conversation Morton came into the office and told Dr. Jackson that the ether had worked nicely,—that the patient suffered no pain." *

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* Modern Anæsthesia, p. 33.

After having had the benefit of Dr. Jackson's knowledge, as above, Morton procured the ether, and administered it, on the evening of the 30th, in the presence of Dr. G. G. Hayden, to Eben Frost, from whose jaw a tooth was extracted, painlessly, while under its influence. Morton subsequently remarks, in his memoir to the Academy of Arts and Sciences at Paris, that he "considers this to be the first demonstration of this new fact in science." We have already seen how new it really was at that time.

Unlike Wells, Morton appears to have had a ready eye to the pecuniary value of anæsthesia; for the next day (September 31st) he went to a patent lawyer for the purpose of patenting his "discovery." The inquiries of the lawyer disclosed the fact that Jackson was as intimately concerned in the matter as Morton; and he accordingly told the latter that both must join in the application for a patent to make it valid. At first Jackson objected to this, on the ground that he might thereby expose himself to the censure of the Massachusetts Medical Society; but finally his objections were removed by the drawing up of an assignment on his part to Morton, which is partly as follows:

"Whereas I, Charles T. Jackson, of Boston, in the State of Massachusetts, chemist, have, in conjunction with Wm. T. G. Morton, of said city, dentist, invented or discovered a new and useful improvement in surgical operations on animals, whereby we are enabled to accomplish many, if not all, operations on animals, such as are usually attended with more or less pain and suffering, without any or very little pain or muscular action to persons who undergo the same, and whereas the said Morton is desirous of procuring a patent for the same, and whereas *I am desirous of benefiting him, and not to be interested in any patent,* I have therefore, in consideration of one dollar, . . . assigned . . . . (to Morton) all my right, title, and interest . . . . in the said invention and discovery," etc.; also further declaring that he (Jackson) had that day signed and executed the specifications, "in conjunction with" Morton, "for the purpose of enabling him to obtain a patent thereon," etc. This paper is dated the 27th October, 1846.*

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* Extracts from the deposition of Dr. James McIntyre, quoted in Smith's dern Anæsthesia, p. 62.

The application for letters patent, with the assignment, was accordingly forwarded to Washington, and the patent obtained, dated November 12th, 1846. In view of after-complications, it will be well to note the fact of the *conjunction* of Jackson and Morton in obtaining it, as shown by extracts from the patent,†—some portions of which were entirely omitted in the presentation of this document before the congressional committee on the "Morton claim," which will be hereafter noted.

As has been seen by the "assignment" of Jackson's interest to Morton, he was "desirous of benefiting him (Morton), and not to be interested in any patent." Nevertheless, Jackson took from Morton at the same time his bond, obligating him to pay over to Jackson ten per cent. of the proceeds of the patent for his interest in it, and subsequently by his counsel demanded twenty-five per cent. of the profits, both at home and abroad, which Morton refused to concede.

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* Modern Anæsthesia, p. 21.

† "Be it known that we, Charles T. Jackson and Wm. T. G. Morton, of Boston, in the county of Suffolk and State of Massachusetts, have invented or discovered a new and useful improvement in surgical operations on animals, ... and we do hereby declare that the following is a full and exact description of our said invention or discovery: It is well known to chemists that when alcohol is submitted to distillation with certain acids, peculiar compounds termed *ethers* are formed. . . . It has also been known that the vapors of some, if not all, of these chemical distillations . . . . when breathed . . . . into the lungs of an animal, have produced a peculiar effect upon its nervous system . . . . analogous to what is usually termed intoxication . . . . What we claim as our invention is the hereinbefore described means by which we are enabled to effect the above highly important improvement in surgical operations, viz.: by combining therewith the application of ether, or the vapor thereof, substantially as above specified. In testimony whereof we have hereunto set our signatures, this 27th day of October, A.D. 1846. (Signed) Charles T. Jackson, Wm. T. G. Morton. Witness, R. M. Eddy, W. H. Leighton."

But another fact regarding the declared conjunction of Morton must now be stated; of which nothing but a desire for historical truth and accuracy will warrant the reproduction. "A few days after the extraction of Mr. Frost's tooth, he (J.) drew up a formal paper, setting forth the nature and particulars of this pretended discovery, and *claiming it to have been exclusively his own;* and this paper, sealed up, he forthwith forwarded to a friend in Paris, and directed him to lodge it in the archives of the Academy of Arts and Sciences there, to remain unopened until he should give further directions on the subject. . . . . Subsequently (December 1st, 1846), the doctor addressed his friend another letter, directing his first communication to be opened and its contents communicated to the Academy."*

At the first session of the Thirty-second Congress (December, 1851), Morton presented a memorial to the House, asserting his claims to the discovery of anæsthesia, and praying for an appropriation in his behalf. This was referred to a committee, of which Wm. H. Bissell, afterward Governor of Illinois, was chairman. Before this committee Jackson and Morton appeared as *rival claimants.* Their *conjunction* had been destroyed upon the receipt, by Morton, of news from Paris. Wells had been some years dead, and his wife and a son of tender years were too poor to employ counsel or enter upon the question of priority in his behalf; and it may be judged that the other claimants would be interested in keeping from the committee any proofs of Wells's use of nitrous oxide. But the committee did obtain a partial and obscure account of his experiments; which account was so treated by the opposing side, that the chairman, in his report, was led to conclude that Wells had entirely failed in his efforts, and that he had abandoned his discovery, on account of such failure, long before his death! We have already learned that the last recorded case of administration of the nitrous oxide by Wells occurred only twenty days before he died.

In the course of an examination before the congressional committee, Dr. Jackson made some very extraordinary assertions; not the least of which was, his statement that nitrous oxide would not produce anæsthesia,—in fact, that it "*possessed no anæsthetic properties*"!

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* Modern Anæsthesia, p. 25.

This Jackson claimed to have reduced to a certainty "by oft-repeated experiments." He also claimed to have discovered the anæsthetic effects of the vapor of sulphuric ether as far back as 1842, through inhaling it as a measure of relief from the dangerous results of an accidental inhalation of chlorine gas. But there is no evidence that he mentioned the discovery to any one before 1846.

The House committee were divided on the claims of Morton and Jackson. The chairman drew up a report, but did not present it. Morton obtained this report, had copies printed, and went with it (unknown to the other claimant) before the Senate Committee on Military Affairs, and induced them, in some unexplained manner, to propose an amendment of the army appropriation bill, awarding to Morton one hundred thousand dollars! But this appropriation was rejected by the Senate by a vote of twenty-eight to seventeen.

Morton, however, was not daunted; and, somewhat altering the form of his application, renewed it at the short session of the same Congress again before the Senate, where it was passed (26 to 23), failed in the House, was again passed in the Senate, and again failed in the House.

Upon the convening of the Thirty-seventh Congress (1862), Morton again pressed his claims; and a very voluminous report was issued upon the subject by the Hon. Henry Wilson, chairman of the Senate Committee on Military Affairs. That report took ground in favor of Morton, but recommended no appropriation for him. In 1864, Representative Hooper introduced a resolution of inquiry into the matter, in the House Committee of Ways and Means. Here Morton again failed, and finally; at least as regards the interference of Congress in his behalf.

Upon the first attempt of Morton to introduce the vapor of ether into surgery, it was met by the older branch of the profession with open arms; but dentistry was more conservative. Dr. J. F. B. Flagg, of Philadelphia, was one of the first dentists of note to identify himself with anæsthesia, and soon announced that *Letheon* (as Morton had empirically termed it) was nothing but sulphuric ether. He refused to recognize the control of this substance by patent, as, in fact, became the case everywhere. But most others were not so conservative as he, and Morton, having appealed to the generosity of the profession, was munificently rewarded. Various medical and surgical associations and institutions, and several individuals, made many contributions to swell the total "recognition" of the claims and merit of the so-called "discoverer." It will be needless to enumerate these; suffice it to say that the Hon. Truman Smith, in his work "Modern Anæsthesia," estimates the total received by Morton up to 1867 as fully *one hundred and twenty-five thousand dollars*, including $50,000 *loaned* Morton, or *invested in his Congressional schemes*, by one William S. Tuckerman. Of this $50,000, and the uses it was put to, there is a rather curious under-history, which, however, does not concern the present consideration of the question.

The Academy of Sciences of the Institute of France awarded to Jackson a prize of 2500 francs "for his observation and experiments upon the anæsthetic effects produced by the inhalation of ether," and to Morton another of like amount "for having introduced this method into surgical practice after the indications of Mr. Jackson."*

Morton's patent, as has been said, was at once repudiated by several,—among the rest the New York Eye Infirmary, which was sued by Morton for having used "his" agent without permission of the patentee. The case was quickly decided by the ruling of the court that the patent was null and void, as the discovery was not within the scope of the patent laws.† But, as above shown, Morton reaped a rich reward for the part he had taken in the introduction of anæsthesia, without much or necessary recourse to any benefits to be derived from his patent. While Morton and Jackson thus filled the world's eye, Wells went, unrewarded and almost unknown, to his grave, leaving his wife and child penniless. When the question of Congressional interference was raised, they were unable to take part in its prosecution, and for years Wells's discovery was allowed to lie idle and unimproved, while ether and chloroform ran their course. This was somewhat short-lived, so far as the dental profession was concerned. A few deaths from chloroform caused its excessive use to be suddenly arrested; and, at this juncture, nitrous oxide again appeared on the scene, in the hands, curiously enough, of the very man who had furnished it for "the first genuine anæsthetic operation on earth."

Mr. G. Q. Colton, having assisted Wells in 1844, as related, resumed his lectures, and continued them down to 1863. Being neither a dentist nor a surgeon, he had no occasion to practice anæsthesia, as such; but about the first of June, 1863, being then in New Haven, but a few miles from Hartford, where Wells's first experiment was performed, he was applied to by Dr. Joseph H. Smith, a dentist, to give the gas in one of his operations; and, as in the primary case, Dr. Smith was so elated with the effects of the agent that he at once ceased the use of ether and began to employ nitrous oxide. In July, 1863, Mr. Colton established the *Colton Dental Association* in New York, for the anæsthetic use of this agent; and from that day its employment has steadily increased in dentistry, to the almost utter exclusion of other anæsthetics.

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* New York Dental Recorder, vol. iv. p. 197.

† Modern Anæsthesia, p. 31.

Simultaneously with this revival, the claims of Horace Wells to the discovery of anæsthesia again came to notice; and this time to some effect. It is true that the Legislature of Connecticut, his native State, awarded to Wells in 1847 a vote of thanks for his discovery of the use of "*nitrous oxide gas or ether in surgical operations.*" But this was almost the only mark of recognition he received until the renewal of his methods and agent by Dr. Smith and Mr. Colton.

The American Dental Association, in 1864, passed resolutions declaring, among other things, "that to Horace Wells, of Hartford, Conn. (now deceased), belongs the credit and honor of the introduction of anæsthesia in the United States of America."[*] In 1870, the Hartford Society of Dentists inaugurated a movement for the erection of a monument to his memory in the public park of the city. To this end the Connecticut Legislature appropriated $5000, and the city of Hartford $10,000.[†] In 1872, the American Dental Association endorsed an effort then being made by dental and medical practitioners to provide a "Wells Testimonial Fund" for the benefit of his family. In 1874, the dentists of London, England, forwarded to Mrs. Wells, with a sum of money, an elegantly engrossed testimonial to the merits of her former husband, "to whom the world is indebted, not only for the introduction of nitrous oxide as an anæsthetic, but also for giving that impetus to the study of anæsthesia which has resulted in the introduction of ether, chloroform, and various other agents for effecting that object."[‡]

Chloroform was discovered almost simultaneously by Mr. Samuel Guthrie, of Sackett's Harbor, New York; Soubeiran, in France; and Liebig, in Germany; in the years 1831–2. Guthrie erroneously supposed his discovery to be the well-known *Dutch liquid*, or *bichloride of ethylen* (which it closely resembles), and consequently called it

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[*] Dental Cosmos, vol. vi. p. 85.

[†] Ibid., vol. xii. pp. 255, 482.

[‡] Ibid., vol. xvi. p. 107.

chloric ether. It was not until 1835 that its composition was accurately determined by Dumas, who gave it its name.

This substance had been administered by inhalation, for pulmonary affections, previous to its anæsthetic effects being discovered by J. Y. Simpson, of Edinburgh, in November, 1847, during his search for something which should replace the ethers for the same object. Its introduction was more quickly accomplished than that of any other like agent; and, for a time, it was very extensively (and somewhat indiscriminately) used in dental as well as general practice.

Some, however, were not fully satisfied of the innocuousness of the new agent, and an alarm was sounded. Shortly afterward the first death from its administration occurred. This induced greater caution; and experience soon proved that chloroform was by far the most dangerous of all the anæsthetics. Upon this the dental profession generally ceased using it anæsthetically, and substituted, first, ether, and later, nitrous oxide. Its employment in dentistry, however, in topical applications, as a solvent, and for other purposes, is very general; and such methods of employment are noted in this work under other headings.

Bichloride of Methylene was introduced by Dr. B. W. Richardson, of London, in 1867. This agent has been experimented with in dentistry to a small extent; but its cost, and the general superiority and certain safety of nitrous oxide, have prevented its very general employment.

Tetrachloride of Carbon, discovered by Regnault, in 1839, came into notice as an anæsthetic agent through Prof. Simpson, in December, 1865.

These newer anæsthetics will require the test of time and thorough experimentation before they can generally compete with better established agents for a similar purpose.

Local Anæsthesia (so called) is simply pain-obtunding topical applications. The principle was first brought to notice in 1850–1 by Dr. H. S. Chase, then of Woodstock, Vermont, who operated crudely on sensitive dentine by dipping a lock of cotton in ether and placing it in the cavity.*

The first full application of the principle was by Dr. Branch, of Illinois, in 1855. He used a freezing mixture of ice and salt, placed in a proper receptacle and applied to the part desired. This was used to some extent, but, owing as much, perhaps, to difficulties in its application as to inherent defects, was finally abandoned.

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* Dental News Letter, vol. iv. p. 23. The effect was arrived at by the evaporation of the ether producing cold.

Various substances which are susceptible of rapid volatilization, thus producing intense cold at the point where they are applied, have been employed to this end. The most prominent among them are *rhigolene* and *ether*, and the most general manner of application is that introduced by Dr. B. W. Richardson, of London. In this the fluid is supplied to an atomizer, or equivalent apparatus, by which a finely comminuted spray of the liquid is forced upon the part affected, its rapid evaporation producing cold of a benumbing character, an effect which is however only temporary, and therefore repeated applications must be made.

Rhigolene is a very volatile product of the distillation of petroleum, and is preferred by some to ether.

Local anæsthesia, by cold produced in this manner, has been used with great advantage in minor surgery, particularly dentistry, but possesses obvious defects in practice, which have prevented its general adoption.

Electric or *galvanic* anæsthesia was suggested as far back as 1851, by Dr. A. Hill, of Connecticut.* But its first practical application was by J. B. Francis, of Philadelphia, in 1858.† Its appearance created a "furor" not alone in dentistry, but in all branches of the medical art, and much experiment was immediately made with the fascinating "lightning" anæsthetic,—so, however, only in one sense; for, although the Franklin Institute awarded the "Scott's Legacy" medal and premium to the inventor, and men of very considerable scientific status highly recommended the new process, yet its popularity soon waned, it being found very uncertain and erratic in action, and generally unreliable, in fact almost useless, from these causes.

MATERIA MEDICA.

This subject is so intimately interwoven, as regards dentistry, with general medicine, and the introduction of the various remedies used in dental practice has been so gradual, and according to the needs or fancies of many operators widely separated from each other by location, and having very sparingly communicated on the subject, that its treatment in historical form is extremely difficult, indeed, strictly so considered, impossible. To the introduction of every remedy there are several claimants, amid which it is not possible to establish either priority or superior value or excellence of modes of practice. The treatment of this subject will therefore be confined to a consideration of only the principal therapeutic agents in use, or which have been so, only such facts and items being admitted as will show the historical range of dental materia medica in American dentistry.

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* New York Dental Recorder, vol. vi. p. 145.

† American Journal of Dental Science, 2d Series, vol. viii. p. 433.

That the pharmaceutics of one hundred years ago, even in medicine, was of much less extent than now, is very certain, and this in spite of the fact that many remedies then standard have passed out of practice, and are at this time obsolete. If this wider range is so well marked in medicine, it is very much more so in dentistry. Healing was comparatively slightly considered one hundred years ago in the practice of what was then a mechanic art much more than a profession. This will be evidenced to the philologist by the fact that our forefathers' aspirations were almost entirely in the direction of dental *surgery*, strictly so called, whereas the present generation might more properly be styled one of dental *medicine*. This change, and the minor facts connected with it, will be more fully noticed in another chapter.

Among the remedies first used in American dentistry, those for the obtunding of pain (notably in odontalgia) and the reduction of inflammation were prominent. For the first of these objects, opium in some of its forms was early and largely employed. Opiates were sometimes also administered internally for odontalgia. A form of treatment for "rheumatic or nervous toothache" is given by Benjamin James (1814),* as follows: "It will be advisable to take cooling purges, to keep the mouth moistened with warm decoction of marshmallows, comfrey roots, or chamomile, to take opium with moderation, or to bleed, according to the urgency of the case. . . ."

In speaking of diseases arising in the region of the gum, root, or alveolus, Flagg (1822)† mentions as remedies "an astringent lotion of tincture of Peruvian bark and rosewater, in equal quantities, or a decoction of marsh rosemary, in the proportion of one ounce of the dried root to a pint of water." These remedies are intended for home application. He also recommends "cold water or vinegar, cold meal poultices, or strong irritating tinctures to the face, and a full dose of Glauber or Rochelle salts"‡ as effectual in removing the pain. For tumors of the gums he says, "The speedy removal of the tumor (by the use of caustics, the ligature, or the knife) is the only plan of treatment on which we can reasonably hope for success."[*]

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* Loc. cit., p. 44.

† Loc. cit., p. 47.

‡ Loc. cit., p. 48.

Fitch (1829) mentions[†] as astringents, nutgall, oak bark, myrtle bark, Peruvian bark, gum kino, the sulphates of copper, of alum, the mineral acids, and acetic acid; as stimulants, nitrous and sulphuric ether, alcohol, rum, brandy, the oils of cloves, cinnamon, peppermint, horse-mint, tansy, and cajeput, "the root of the *petevcria alliacia*, called the guinea-hen weed," also the bulbs of most alliaceous plants, including the "common hartwort or *läserpitium silex*, which has long been celebrated as a sialogogue and remedy for the toothache," camphor, and errhines; as anodynes and narcotics, opium, henbane, the leaves of the thorn-apple plant, and tobacco in extract, tincture, or fumigation. As caustics he notes, caustic potash, nitric and vitriolic acids, and nitrate of silver. He also gives several formulas, from which the following are extracted:

For odontalgia.—1. "Pulvis gallæ, ʒii; opium, ʒss; pulvis camphoræ, ʒjss; tinct. daturæ stramonii, q. s. to reduce the substances to pills." 2. "Ol. cassiæ, v gt.; do. cloves, v gt.; pulvis gallæ, q. s. to pill."

Antiscorbutic remedies.—1. Antiscorbutic tincture—"Pulvis gallæ, ℥iii; camphor, ʒi; best port wine, ii lbs. Misce. Let stand in a warm situation three days." 2. "Saturated decoction of the cortex querci, ii lbs.; tinctura thebaici, ℥i. Mix."

In 1830–1[‡] we have records of several formulas then in use by dentists. The following are some of them:

Astringent application to spongy or scorbutic gums.—"Into a quart of port wine or claret put a drachm of alum and another of acorns; a drachm and a half of galls, and half a handful of good day-dried red rose leaves: boil them down to half, and then strain, and dissolve in it a drachm and a half of gum-Arabic bruised in small pieces; and with this liquor, a little hot, wash the teeth and gums daily."

"To fasten teeth: gargle with honey-water and myrrh; or, add honey and myrrh to a decoction of sage leaves."

For the treatment of aphthæ in cases of thrush, "borax, one drachm; honey, one ounce."

As the single proper remedy for the diseases odontitis, periostitis, exostosis and necrosis, Spooner (1836)* recommends extraction, saying, "the various applications in common use, at best are only palliating." He declares that "the most powerful of temporary remedies" which he had used "is either the acetate or sulphate of morphia" introduced on a lock of cotton at the end of a probe. This he names as superior to creasote, then lately introduced. He contends that the only effectual cure for alveolar abscess is "the extraction of the dead teeth or fangs."

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[*] Loc. cit., p. 69.

[†] Loc. cit., p. 523, *et seq.*

[‡] Economy of the Teeth, etc.

Harris (1839),† in treating of inflammation of the periosteum, advised leeches and fomentations of the face, with cataplasms of hyoscyamus, mustard, or hot salt with vinegar and laudanum. He used, in cases of spongy and bleeding gums, a solution of nitrate of silver, painted upon the parts.

Roasted figs and bruised raisins were early used in the treatment of periodonteal inflammation, being applied as a poultice to the gum. Among the astringents were solutions of some of the salts of lead.

With this meagre mention of remedies previous to about 1835, the strictly historical portion of the subject is passed, it seeming more profitable to make a statement of the principal articles comprising the modern materia medica than to attempt fixing their dates of introduction.

Common Salt, in saturated aqueous solution, is often all that may be needed to check bleeding after lancing the gums or extracting teeth. A weaker aqueous solution is sometimes used in syringing the cavity of an abscess. Salt is the antidote for poisoning, by nitrate of silver, and its instant application in cases of the caustic coming in contact with parts not intended to be touched, may prevent very embarrassing consequences.

The *salts of morphia*, particularly the *acetate* and *sulphate*, have long been in use as among the most popular and reliable means of relieving the intense pain of acute pulpitis. The acetate is used in aqueous solution with carbolic acid, or in solution with deliquesced carbolic acid. These salts are also used, in combination with arsenious acid and some menstruum, to form a paste for the devitalization of the pulp. In those cases in which it is desirable to bridge over an interval of pain, these salts are sometimes administered internally, in the usual doses, or by hypodermic injections of their clear solutions. Resort is sometimes had to these solutions, or to laudanum, in local applications for the relief of pain.

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* Guide to Sound Teeth, etc.

† The Dental Art, etc.

Within a few years *sulphate of quinia* has obtained a place in the dental materia medica, being claimed to be almost a specific in periodontitis. This agent is also administered in cases of neuralgia, particularly those characterized by regular recurrence of pain at certain hours.

The *saline cathartics*, of which Epsom salt may be taken as the type, are efficient aids in the treatment of periodontitis and incipient alveolar abscess.

Perhaps there is not, in the range of dental materia medica, a remedy which has been so empirically and indiscriminately employed as *creasote*. In past years its range of indication has been held to be hardly more limited than that of dental disease. Its antiseptic property renders it valuable for saturating such partially decomposed dentine as is sometimes allowed to remain over what would otherwise be an exposed pulp. It is also much used for wiping out the canals of pulpless teeth. It has been largely employed for the relief of odontalgia arising from an exposed pulp, the surface of which is changed to an eschar by its caustic qualities. There are, however, doubts about the deposition of secondary dentine from a pulp so treated; and many practitioners have discarded this method of using creasote, on account of this and other physiological objections to the material.*

The above agent has been, in a degree, superseded by *carbolic acid*. This was found in 1834, by Runge, in coal tar, but attracted little attention until nearly a decade later. It meets many of the indications formerly filled by creasote. The saturated aqueous solution is applied to an exposed pulp as a corrective of septic influences, and, in conjunction with acetate of morphia, to relieve pain. It also forms a valuable cleansing and stimulating dressing for abscesses and suppurating surfaces, as it is claimed that zymotic, sporadic, and parasitic organisms cannot live in its presence, and that fermentative and putrefactive changes are prevented by it. The deliquesced acid is of some value as an obtunder of sensitiveness in dentine. Its use as a styptic has been suggested, from the fact that it forms with albumen an insoluble carbolate.

Camphor is used by some to disguise the odor of creasote. A saturated solution of camphor in chloroform has been spoken of as an efficient application for the relief of pain following the extraction of a tooth affected with acute abscess.

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* The employment of genuine creasote obviates some of the above objections. Most of that now sold in the shops as creasote is, in reality, impure carbolic acid. Creasote is obtained by distillation from wood tar or crude pyroligneous acid. Carbolic acid comes from coal tar.

Oil of Turpentine, once a prominent remedy for the odontalgia of pulpitis, is now almost out of use for that purpose. It is by some combined with wax to form a salve-like capping for exposed pulps. The application of this covering is nearly painless, and the most gratifying formations of secondary dentine have been shown to have taken place beneath it.

Aconite ranks among the most efficient remedies for the relief of pain and inflammation, and is also much valued for aborting the last pathological condition, when used in the incipient stages. It is especially adapted for use in inflammations and neuralgias of limited extent and acute character. It is considered to act particularly on nerve-tissue, either when applied locally or administered systemically. Facial neuralgias are often relieved by external application of some of its stronger preparations over the course of the nerve implicated.

Calendula is applied to incised and lacerated wounds, tending to relieve pain, prevent inflammation, and produce rapid healing. It is not now officinal, but is provided both as tincture and as fluid extract.

Tincture of Arnica has been extensively used to meet the same indications noted for calendula, but is now considered to be of much less value. It has even been shown that its application to abraded surfaces is, in some cases, poisonous.*

Arsenious Acid. During the last forty years this agent has been more extensively employed than any other for the devitalization of pulps. It was first used for this purpose about 1834, by Dr. John R. Spooner, of Montreal, and published to the profession in 1836, by his brother Shearjashub.† In this country it has generally been employed in combination with some drug intended to lessen the pain of its action. The following formula is believed to be among the best:

Acidi arseniosi, gr. j;
Morphia acetatis, gr. ii vel iii;
Sol. acidi carbolici, q. s. to form a paste.

Arsenious acid has been used to obtund the sensitiveness of dentine; but the danger to the pulp by this method is such that it is now little employed for that purpose. Indeed, many do not now use the agent at all, and its general employment is much less than formerly.

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* Boston Medical and Surgical Journal, January 21st, 1875, p. 61.

† Guide to Sound Teeth, etc., New York, 1836, p. 115.

Nitrate of Silver has been employed for numerous purposes in oral medicine, as for obtunding sensitive dentine in aqueous solution in aphthous affections, as an escharotic in solution or in crystal, as a hæmostatic, and in other directions; but objections, of greater or less gravity, hold against it for nearly every one of them. The discoloration of dentine produced by it forbids its use on surfaces exposed to view, and the depth of its action endangers the pulp. The harshness of its action and the solubility of the eschar operate against its styptic employment.

Lime Water is astringent, tonic, and antacid. It often follows the exhibition of acid medicines to protect the teeth from their corrosive effects, and in its use as a tooth-wash is considered one of the best prophylactic remedies against caries. The chemically prepared carbonate is also a valuable antacid, and of much importance in dentifrices.

Chloride of Lime is one of the most valuable bleaching agents.

Calcium Sulphate with water has been used as a capping for exposed pulps.

During later years it has been discovered that internal administration of some of the *salts of lime* apparently tends to greatly improve the texture of soft and poorly organized teeth. To this end, food rich in lime salts has been recommended, and has seemed in some cases to produce remarkable results, such being more marked in childhood than in adult life, and the theory claiming the best time of administration to be during uterine life, through the food of the mother. The principal element sought to be supplied has been the phosphate of lime, which has been exhibited in many forms; as, the precipitated phosphate in powder or solution, Wiegand's and other syrups, preparations of the lactophosphate and the hypophosphite, and compound solutions of the hypophosphites of lime and soda.

Good results are claimed to have been obtained from the use of lactophosphate of lime as a capping for exposed pulps. The hypophosphite has been suggested for the same purpose, and also for bathing cavities after excavation and before filling with metals, to prevent subsequent sensitiveness to thermal changes.

Bicarbonate of Soda is among the valuable antacids for both local and systemic exhibition. It is used in aqueous solution as a mouth-wash in acid conditions of the oral secretions. These conditions are also combated by the internal admin [illegible] alkali. This agent is also of use in the treatment of sensitive dentine, ranking among the milder and perfectly safe remedies. *Aqua calcis* is also used for the same purpose.

The *solution of chlorinated soda* is employed in the treatment of aphthous, gangrenous, and putrid affections of the soft tissues, and also from the presence of chlorine in bleaching discolored dentine.

Phenate of Soda (Phénol sodique) is antiseptic and astringent, and efficient as a styptic in the less severe cases of hemorrhage after extraction.

The *sulphite, bisulphite,* and *hyposulphite of soda* are each recommended for the treatment of parasitic vegetative conditions of the soft tissues. Strong solutions of either of these assist in removing iodine stains, and a saturated solution of the hyposulphite added to tincture of iodine gradually decolorizes the latter.

Borax is another of this class of salts used in the treatment of aphthæ, either alone, or in combination with sugar or honey.

Water of Ammonia and *spirits of ammonia* are useful in cases of syncope and nervousness. For internal exhibition the *aromatic spirit* furnishes the most agreeable form. The stronger water of ammonia is successfully used in some cases of sensitive dentine.

A solution of *gum sandarac* in alcohol forms a varnish much used on cotton, to retain and protect applications to exposed pulps. It is also used on oxychloride fillings while setting, to protect them from moisture.

Alum is employed in the treatment of relaxed and irritable conditions of the soft tissues. A continuous washing of excessively tender mouths facilitates the taking of an impression and the wearing of artificial dentures. It is also employed as an astringent and styptic.

Glycerin, while not destitute of useful medicinal qualities of its own, is principally employed as a menstruum or vehicle of exhibition of other agents. Valuable combinations are made of glycerin with iodine, creasote, carbolic acid, tannic acid, the salts of morphia, some of the salts of soda, and other agents.

Canada Balsam is used as a protection for exposed pulps.

Tincture of Myrrh is one of the oldest remedies for relaxed, inflamed, and congested gums. Myrrh is also an ingredient of many of the more complex mouth-washes.

Collodion is considered one of the most effectual means to be used for the prevention of external breakage of alveolar abscess. It has also been used as a protection for exposed pulps. It is also applied to wounds, and as a dressing after surgical operations. It is often variously medicated, and is thought to be advantageous as a vehicle for the application of counter-irritants, as cantharides and iodine.

Tannic Acid is among the stronger astringents. It is one of the most powerful hæmostatics. In various solutions it serves in the treatment of cancrum oris, diseased antrum, and generally where an astringent is indicated. The solution in glycerin is valuable. A saturated solution of tannic acid and gun-cotton in ether forms the *styptic colloid*, suggested by Dr. B. W. Richardson.

Several of the salts of iron are in use as styptics. Of these preference is generally given to the *subsulphate* and the *perchloride*. Monsel's solution of the subsulphate is a convenient and familiar form. Also cotton is saturated in the solution and allowed to dry, making *styptic cotton*. These salts are reckoned the most powerful of hæmostatics.

Pungent oils are considerably in use in the treatment of sensitive dentine. Among them may be named the oils of *cloves*, *mustard*, *peppermint*, *cajeput*, and *horse-radish*. The first named is much employed to relieve odontalgia from exposed pulps. Within two years a proprietary preparation, said to have the oil of horse-radish root as one of its principal ingredients, has been tried as an obtunder; its effects, however, have not been uniformly successful. Pastes or poultices of the flour of mustard are of use where external counter-irritation is indicated.

A solution of gutta-percha in chloroform is, for some purposes, preferred to collodion, being free from contraction during the evaporation of the menstruum. It supplies a ready means for retaining medicaments in cavities, and is also one of the many materials used for pulp-capping.

The preparations of iodine are among the most important medicines used by the dentist. In the treatment of hyperæsthesia, congestion of the pulp, and periodontitis, iodine is one of the most commonly employed counter-irritants. Iodine hastens the absorption and resolution of exudations of pus and hence its employment in abscess and other diseases. When iodine is used upon tooth-substances, the [illegible] prevents the discoloration otherwise inevitable. Various and indolent states of other affections of the soft tissues are [illegible] by applications of this agent. Iodine is combined with various other drugs, as carbolic acid, creosote, and aconite. These combinations possess the properties of both ingredients and are used where both seem indicated.

One or two of the *salts of zinc* form the main reliance of some dentists in the treatment of alveolar abscess. The *sulphate* and the *chloride* are usually employed, the weaker aqueous solutions being most generally efficient. These salts also appear to exert a peculiarly favorable influence upon manifestations of the mercurial impression.

Chloride of zinc in deliquescent crystals is among the most effectual remedies for sensitiveness of dentine. Some dentists prefer the action of the chloride as obtained from fillings of the oxychloride, repeated if necessary.

Chromic Acid has been suggested as an obtunder for sensitiveness of dentine; but the dangers connected with its use seem to prevent its general employment.

Oxalic Acid stands at the head of the list of bleaching agents for discolored dentine.

During the year 1875, the attention of the profession was called to *salicylic acid* as possessing the more desirable properties of carbolic acid without being an escharotic. In some cases of pulpitis and alveolar abscess its use appears to have been attended with the happiest effects. Experiments appear to show, however, that as an antiseptic, antizymotic, disinfectant, and deodorizer it is inferior to other agencies previously employed for the same purposes.

Nitric Acid has been used for sensitive dentine, and weak dilutions of *sulphuric* and *chlorohydric acids* for cleaning teeth; but their dangerous qualities are so great that the majority of practitioners do not indorse them.

The *aromatic sulphuric acid* occupies a special field in the treatment of necrosed bone. It is also, by a few, employed in alveolar abscess and some other affections.

The *bicarbonate of potash* is capable of meeting much the same indications as the bicarbonate of soda. The *chlorate* and *permanganate of potash* are of use in aphthous affections. The last is especially valuable in indolent, gangrenous, and fetid conditions.

Tinctures of *white oak bark*, *kino*, *krameria*, and *catechu*, as astringents, and *pellitory* as a counter-irritant, have had considerable employment; but the majority of them are probably now less used than formerly. The same is true of the *terchloride of gold* for sensitive dentine, and of *matico* as a hæmostatic.

Preparations of *Erigeron Canadensis*, of some of the *salts of lead*, and of *lead with opium* are employed in the systemic treatment for hemorrhage. Solutions of the *acetate* and *sub-acetate of lead* are also used locally as styptics.

Carvacrol and *thymol* meet the indications in acute affections of the pulps consequent upon perforating caries, and are by some preferred to creasote or carbolic acid. Thymol is sometimes combined with glycerin.

The use of *pepsin* has been suggested to aid in the thorough cleansing of canals after devitalization of the pulps, and appears to serve a very useful purpose.

Tincture of Capsicum is used in some cases where active stimulation is required, and may be also employed as a counter-irritant.

An *extract of hamamelis* is by some employed after the extraction of roots and in the treatment of other wounds, to allay pain and produce healing.

Hydrate of Chloral is employed to some extent as an anodyne narcotic. It appears, however, to lack uniformity of action, and has not attained to the position it might otherwise have held.

To assist sensitive and delicately organized patients to undergo trying operations, *sulphate* or *meconate of morphia*, in alternation with *lactucarium* or *assafœtida*, are sometimes exhibited twelve to eighteen hours before operating.

Such are some of the drugs to which the oral practitioner of to-day has most frequent recourse. The list is by no means complete, nor can it be rendered so, as circumstances may occur and conditions be presented which may indicate the use of almost any article in the range of medicine.

EXTRACTION AND TRANSPLANTATION.

The extraction of an aching tooth was, very probably, the first dental operation ever performed, and, for a long time, was the principal one; and even as late as 1836, Spooner recommends it as the sole remedy for "odontitis, periostitis, exostosis, and necrosis."*

Woofendale, in 1783, says,† "There are some teeth which it is impossible to draw. This happens when the roots are crooked, or, what the dentist calls locked in the jaw; or, when the roots of the double teeth diverge much, which most commonly those of the upper jaw do. . . . It frequently happens that when any of these teeth break in the attempt to extract them, the roots may be got out with the greatest ease in a day or two, a week, or a fortnight afterward, though not at the time the tooth breaks."

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* Guide to Sound Teeth, New York, 1836, pp. 93, 94.

† Observations on the Teeth, London, 1783, p. 81.

Of lancing the gums in extraction, Hunter (1771) remarks that it "is attended with very little advantage, because at best it can be only imperfectly done, and that part of the gum which adheres to the tooth decays when it is lost." Woofendale, however, advises that the gum be "always lanced or separated from it (the tooth) as effectually as possible."* He used only dried sponge or lint, with compresses, and to keep the body cool, for cases of hemorrhage after extraction, saying, "I never had occasion to use any other means."

Perhaps the first expression of the opinion that extraction in general is an evil and should be avoided, which occurs in any American dental work, is by L. S. Parmly, in his work on "The Management of the Teeth," Philadelphia, 1819, page 127. He says, "My experience warrants me in asserting that extraction is much oftener resorted to than is necessary. Whenever a tooth is painful, it is advisable to have it examined, and an endeavor should be made to remove the malady by palliative means, and if it prove carious the diseased part should be removed and the tooth repaired. Indeed, there is no necessity for having recourse to this dangerous expedient (extraction) even if the crown be entirely decayed; for the fangs of the teeth will always admit of engrafting. Extraction, therefore, can only be necessary either to prevent or remedy irregularity in the arrangement of the permanent teeth of children, or in some diseases of rare occurrence in the adult. . . . In all other cases it is to be opposed, and is a wanton outrage on the unhappy individual who, from the effect of pain, is brought to submit to this harsh and often unavailing measure. . . . Where extraction, however, is advisable, I employ an instrument similar to *that of* (*sic*) an engraver's tool. In this I differ from all other operators, for they uniformly prefer the key instrument, so long in use. It is true that it has undergone several alterations and has received some improvements; but the principle of it, even in its most improved state, remains the same, and cannot be too strongly reprobated."

To this subject Koecker gives no less than 80 pages, in a work of 445,† or nearly one-fifth of his book; from which may be inferred the importance he attaches to extraction. He remarks, "When we consider the frequent necessity for this operation, and its beneficial effects even only so far as it regards its physical influences, the great importance of it seems to be placed beyond any doubt; and, indeed, on all accounts it must be allowed that there is not an operation in any branch of surgery more worthy of the particular consideration of the liberal-minded and scientific surgeon, than extraction."

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* Loc. cit., p. 84.

† Principles of Dental Surgery, London, 1826, pp. 300-380.

Koecker mentions the punch, the pelican, the key, and "some pairs of forceps," as the instruments then in general use in extraction. He deprecates the use of the key, says the pelican is almost obsolete, and the punch extremely ill-adapted to its purpose, and adds, in regard to forceps, that those "in common use at present are generally so ill-contrived as to be usually applied (only) in cases of no difficulty;" but that "the application of this instrument would be far preferable to that of any other, in many cases, were it better constructed for its intended purpose. At present, however, forceps are usually applied only for removing loose teeth."

Fitch,[*] in reference to deciduous teeth, says they should be extracted when carious, but not until they become loose. He advocates the use of the key, though admitting that forceps should be employed "when the dentist can extract the tooth without the key."

Harris[†] says of the forceps, that "until the last seven or eight years they were not very commonly or extensively used. But the improvements that, during this period, have been made in their construction, are so great, that their use has now, with many practitioners, altogether superseded that of the key."

From about the year 1825 there appears to have grown gradually a feeling in the profession against the indiscriminate extraction so common before (and, to a large extent, after) that period. This date is also that of the general appearance of the idea that teeth should be saved, not extracted. This idea accumulated strength, until at present it may be said to be a cardinal point in dentistry; and the extraction of teeth is now resorted to, by the best practitioners, only in cases where preservative agencies would fail, or in the correction of irregularities.

The *transplantation* of teeth is an old operation; but as Hunter was the first and greatest of dental writers to advocate the practice, its origin has been ascribed to him. This is not correct, as will easily be seen by a perusal of his well-known work. He says, in Part II., "The insertion of a dead tooth *has been recommended,* and I have known them continue for many years." In regard to the operation, he remarks, "Although this operation is in itself a matter of no difficulty, yet, upon the whole, it is one of the nicest of all operations, and requires more chirurgical and physiological knowledge than any that comes under the care of the dentist. . . . The *incisores*, *cuspidati*, and *bicuspides* can alone be changed, because they have single fangs. The success is greater in the *incisores* and *cuspidati* than the *bicuspides*, these last having frequently the ends of their fangs forked. . . . . It is hardly possible to transplant the grinders, as the chance of fitting the sockets of them is very small. When, indeed, a grinder is extracted, and the socket sound and perfect, the dentist may, perhaps, be able to fit it by a dead tooth."

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[*] A System of Dental Surgery, New York, 1829, p. 858 *et seq.*

[†] Dental Surgery, Baltimore, 1839, p. 181 *et seq.*

In the earliest days of American dentistry, this operation was considerably in vogue. It was introduced here by Lemaire; who, as we have seen, came to this country with the French army in 1781. His advent in Philadelphia is noted by an advertisement (1784) in which he proposes to transplant teeth for the citizens of that town, and states that he had, in the six months previous, "transplanted successfully 123 teeth."* The chronicler adds, that this was quite a novelty in Philadelphia, and that "Doctor Le Mayeur" had "great success," and "went off with much of our patricians' money;" also, that "several respectable ladies had them implanted." Unfortunately for Lemaire's reputation as an operator, however, "they were, in some cases, two months before they could eat with them."†

Of Lemaire's practice in this regard we have further accounts. James Gardette, in the Philadelphia *Medical Recorder*, 1827, says that "Mr. Lemayeur, with the reputation of an eminent dentist, had transplanted one hundred and seventy teeth in this city, in the course of the winter of the years 1785 and 1786, as he told me himself, at Baltimore, in the fall of the last-mentioned year; and that, of all those transplanted teeth not one succeeded! Some became firm, and lasted, more or less so, for one or two years, in the sockets in which they had been inserted; but those cases were very rare." After citing many cases of failure in transplantation which had come under his notice, among which were two of John Hunter's and some of his own operating, Mr. Gardette adds, "My opinion, therefore, is that teeth cannot be transplanted from one mouth into another so as to answer the intended effect. . . . I therefore believe that there are a thousand chances to one against the success of the operation."

Dr. Josiah Flagg, also, as appears from an existing circular of his, dated 1796, "Transplants both live and dead teeth with great conveniency, and gives less pain than heretofore practiced in Europe or America."

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* Watson's Annals of Philadelphia, vol. i. p. 179.

† Ibid.

In fact, for several years after its introduction, transplantation was a part of the practice of the most prominent American dentists. In their excuse it may be said that they were much nearer the great teachers of the science (Hunter, Fox, Bell, etc.) than are the dentists of to-day; and the practice of such leaders appeared, and then was, the best they had to follow.

But experience proved a better leader in the end than books. The almost invariable want of success in the operation, and the better methods of practice which gradually came into vogue, led to its final discontinuance; and it is thought that, for many years past, the practice of transplantation has not been attempted, except in a few isolated instances.

Replantation, an operation akin to the last noticed, was also particularly advocated by Hunter, and has probably had more of success to recommend its employment than the other. Dr. James Gardette says of it,* "It has sometimes happened that a dentist has extracted a sound tooth for a bad one. . . . If such tooth is replaced in its socket immediately after extraction, it will certainly become as firm and useful as ever." Dr. Gardette held that the principal cause of failure in transplantation was the impossibility of obtaining exact adaptation of the tooth inserted to the socket which received it, saying,† "If another tooth could have been found, the root of which was exactly of the same length, size, and form, it might have been placed in the socket of the tooth (extracted), and it would certainly have become as firm, and have lasted as long, as the tooth which had grown in that socket."

One phase of Dr. Gardette's replanting practice deserves notice from its then novelty of purpose. He says,‡ "I have frequently partially extracted and returned to their sockets, small and large molars which had been very painful, after having cut the gum on the side opposite to that on which I intended the tooth to fall in partially extracting it. The purpose of this operation is to separate or rend the nerve asunder, so as to prevent the tooth from giving pain in future; the tooth is then put back into its socket, permitted to become firm, and the cavity is then to be plugged; this I always did with full success." Dr. Gardette is believed to have been the first to perform this operation.

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* Amer. Jour. Dental Science, 1st Series, vol. x. p. 64. † Ibid. ‡ Ibid.

As a curiosity in replantation may be mentioned the extraction of diseased teeth, their being filled *while out of the mouth,* and their subsequent replacement in the sockets from which they came. There are accounts of many such cases. The success of this operation may be considered to be doubtful, although sufficient time has hardly elapsed to fully demonstrate that conclusion.

Replantation has also been often resorted to as a means of relief in cases of alveolar abscess and of irritation arising from dental exostosis, with good results.

FILING AND REGULATING.

The reasons for the use of the file are given by Woofendale, 1783, as follows:* "Teeth are filed on various accounts, viz.: to remove broken or jagged points, which happen either from accident or decay, and are liable to injure the cheek or tongue; to stop the progress of a beginning or advancing caries; to round off the edges of teeth (though not decayed or broken) that grow irregular and prove troublesome to the cheek or tongue; and lastly, for ornament." He adds, "Some universally condemn filing the teeth; on the other hand, some are for having all teeth filed. . . . I apprehend some teeth cannot be filed without being injured by it; others cannot be saved by any other method."

Crude as were the above ideas respecting the use of this instrument, they were universally held at the date of Woofendale's writing. The removal of "broken or jagged points" and the rounding off "of edges of teeth that grow irregular and prove troublesome to the cheeks or tongue," are ideas descended direct from Celsus. "To stop the progress of a beginning or advancing caries" shows a considerable accession to artistic dental processes as well as scientific knowledge.

It was not long before even further progress was made in professional breadth and accuracy of view. Benjamin James (1814) says,† "The sides of the upper teeth lie closely together, while the crowns of the under teeth touch only at that point which is most distant from the gum. For this reason noxious accumulations between the upper teeth cannot be so easily removed as between the lower teeth. It is therefore in the power of the file to destroy the greater aptness of the upper teeth to decay." Here it is evident that, from saving already-decayed teeth, the idea has advanced to the prevention of such decay.

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* Practical Observations on the Human Teeth, London, 1783, p. 156.

† A Treatise on the Management of the Human Teeth, Boston, 1814, p. 58.

In illustration of the early objections to filing teeth, we will quote Josiah F. Flagg, from page 69 of his work, "The Family Dentist," published in Boston in 1822. "The particular objections to the use of these instruments are: 1. That they do not remove the whole of the decayed parts of the teeth; and it is a fact sufficiently evident to common observation that the disease of caries is often communicated from one tooth to another by contact; and it is equally true that, while any of the defective part of a tooth is suffered to remain, the liability of that tooth to decay is much greater than if this part were entirely removed. 2. That in all cases the effect of sawing or filing is to deprive the teeth unnecessarily of a great portion of their sound enamel, particularly when these operations are performed on the front teeth. 3. That the crowns of the teeth being broader than their fangs, they often crowd together in such a manner that, by the repeated operations of filing to keep them separated, one-quarter, and sometimes one-third of each tooth is sacrificed by the use of these improper instruments. 4. That separating *sound teeth* with the file or saw (or, indeed, with any other instrument) is a practice for which there can be no reasonable apology. The idea that they may be too close, and injure each other by lateral pressure, is altogether erroneous, and there are no just grounds for the belief that, by this operation, they may be prevented from decaying. . . . As a substitute for files and saws, it is now recommended to use, in the operations for caries, small, crooked knives and other cutting instruments, which are liable to none of the above objections, and which enable the operator to effect the first and (which are) also the most important objects in the treatment of this disease."

Fitch, too, in 1829, writes at great length against the separation of sound teeth by the file, in the course of which he says,* "The direction of Mr. Fox to divide (separate) the teeth when crowded merely, and not carious, has, by its injudicious adoption and indiscriminate performance, been productive, probably, of more injurious consequences than any mode of practice, or any direction ever given by any writer or practitioner of dental surgery. Almost every dentist who has read Mr. Fox, has adopted and followed this practice. The pernicious consequences of it are seen almost every day."

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* A System of Dental Surgery, New York, 1829, p. 387.

Spooner, on page 129 of his work on the teeth, published in New York, 1836, speaks as follows with regard to filing: "We have precisely the same ideas in relation to the use of the file when it is injudiciously employed as those have who do not discriminate between its proper application and its abuse; yet we are bold to affirm, that its employment in the hands of a skillful dentist is a most efficient and sure means of removing and arresting incipient decay of the teeth, and, as thus employed, is approved by the best dentists of the age. Some dentists are in the habit of separating the front teeth when perfectly sound, to prevent decay. We totally discard this practice. . . . It is quite in time to tamper with the disease and to dabble with the remedies after the former has made its appearance. Finally, upon this subject, we would advise adherence to the following maxims: *First.* Never file a tooth except disease justify the use of the file. *Second.* Consider filing a less evil than disease, and consequently to be preferred to it. *Third.* Never file a tooth for the removal of caries, unless by so doing you can extirpate the disease effectually, and that, too, without too great a sacrifice of the substance of the tooth, and at the same time do not injure the chance for the operation of the plugging, should circumstances subsequently require it. *Fourth.* Do not file a tooth that can be better and more effectually treated by plugging."

These extracts will show the strong feeling against improper use of the file which has always existed in the profession; and the separation of sound teeth is also indicated as the extreme of such wrong employment, and as especially to be reprobated.

Since a comparatively recent period, somewhat advanced ideas in the treatment of caries have become generally promulgated. The principal of these comprehends the *prevention* of decay in contradistinction to its treatment after formation. This object, in itself indicative of a high scientific and humanitarian stand-point, has been proposed to be attained by the early extraction of certain teeth, the removal of which should, by affording sufficient space, allow the natural separation of the remainder, and thus avoid that lodgment of interstitial deposits which has always been recognized as one of the principal sources of decay. This course of procedure has obtained very largely, although strenuously opposed by many.

Among those in opposition to the above process of prevention, another method has sprung up, or rather, been revived; for it is simply a recourse to the old, and so long and strenuously deprecated use of the file. This method is employed by some dentists of very superior professional eminence, but has not been generally adopted, and is quite as strongly opposed, and much more widely than the extraction of the now somewhat notorious "sixth-year molar."

IRREGULARITIES.

The treatment of dental irregularities has been long a subject of much moment in operative dentistry, and has engaged, especially more lately, the best energies of some of the foremost men in the profession. From the correction, at first, of only the simplest deviations from normal position, it has become possible, and even usual, to rectify the most marked and excessive malformations of the dental arch. The methods by which these results are now obtained do not appear to differ greatly in essentials from those formerly employed; and thus, although much improvement over the older forms is manifest in modern appliances for regulating, the principles of mechanical action involved are much the same as before; from which it will be justly inferred that the advance apparent in the treatment of irregularities is more an extension and amplification of ideas formed long ago than the introduction of new ones or different theories.

Following the older authors whom we have already quoted on the previous subject, and in pursuance of the plan generally adopted throughout this work, a chain of ideas on the subject will be presented, which shall illustrate the growth and progress of methods of treating irregularity.

Woofendale says,* "Was proper attention paid to the removal of the first set of teeth, the just symmetry and proportion of the second might be preserved, and consequently every inconvenience and defect arising from irregularity would be avoided. . . . When the teeth come irregular, and have been neglected for some time, they frequently may be reduced into proper order with safety. This operation often takes some months if the teeth are much out of their places. The younger the patient the better when this operation is to be performed. There is a method of performing it very expeditiously, by twisting the teeth into their places by means of a pair of strong plyers. This method is practiced by some; but it may not be improper to observe, that the patient is liable to have the bony socket split, or the teeth broken or forced out in the operation; yet allowing none of these accidents to happen, they often remain loose and troublesome ever after." When the coming of the canines is much delayed, and there is a prospect of their irregular presentation, he says, "it is sometimes (though not always) advisable to take out either the first double, or the second single teeth, to give room for the progress of the eye-teeth."

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* Observations on the Teeth, 1783, p. 23.

Benjamin James writes,* "With proper attention paid to the removal of the first set of teeth, the regularity of the second may be anticipated. . . . The jaw of a person very young is so soft and yielding that a tooth taken out at a considerable distance from a deranged tooth makes room for it; the teeth on each side of the one extracted crowding in to fill up the vacancy. But when the jaw has become more hard and unyielding, we can make room for deranged teeth only by drawing those in immediate contact with them. Then, by gentle compression of the finger, applied daily for several weeks to the deranged tooth, we see it come into its proper place as effectually as from ligatures, springs, or violence."

L. S. Parmly observes,† "In all cases of irregularities, during the shedding of the teeth, the treatment to be observed is to remove the obstructing temporary teeth, and then to apply pressure, in the most convenient manner, upon the irregular tooth, in order to direct it into its proper situation. . . . Where the permanent teeth are large, and the jaw-bones have not grown sufficient to admit of their enlargement in a regular manner, they crowd and overlap each other. . . . When the space of the jaw is not sufficient for the regular arrangement of the teeth, some must then be considered as superfluous, and it will be necessary to remove one or more of the *bicuspides* from each side of the jaw, before the fangs are formed (*sic*), to give room to the rest; the *incisors* must then be gradually forced into their proper situation. The occasional pressure of the finger and thumb, if attended to before age has given too much firmness to the jaw, will invariably bring the teeth into their proper places, without the necessity of having recourse to continued pressure by means of instruments adapted to the arch of the mouth, as recommended by Mr. Fox."

Koecker recommends,‡ as preventive of irregularity in secondary dentition, "extracting some of the permanent set at an early period, in order to give sufficient room for the rest. . . . The first molars are generally most predisposed to disease; they are least important as it regards both appearance and utility, and so situated as to afford, by timely removal, sufficient room for the anterior teeth, as well as for the second and third molares. If these teeth are extracted at any period before the age of twelve years, all the anterior teeth will grow more or less backwards, and the second and third grinders so much towards the anterior part of the mouth as to fill up almost entirely the vacant spaces caused by the removal of the first molares."

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* A Treatise on the Management of the Human Teeth, 1814, p. 100.

† Lectures on the Management of the Teeth, 1819, p. 145.

‡ Dental Surgery, 1826, p. 191.

Fitch (1829)* quotes Fox at great length respecting the treatment of irregularities, and seemingly rests his own practice on the directions then recorded, for he does not make any essential additions to the modes or practice of the older author. The methods named are all on the single principle of ligatures or other apparatus attached to sound and regular teeth in such a manner as to compel the irregular ones to assume their proper position.

Spooner says,† "To remedy many cases of irregularities it is necessary to have recourse to gold or silver plates, or other mechanical contrivances. When the front teeth stand too far asunder, from natural conformation or from too early extraction of the temporary teeth (!), they may readily be brought into their proper position by means of silken ligatures frequently renewed so as to exert a gentle but continued pressure."

Dr. Harris gives very particular and detailed directions for the treatment of various kinds of irregularities, following, generally, the practice of Fox, whose methods, he says,‡ "have formed the basis of the established practice of the last twenty-five or thirty years, and this long trial has proved that they were founded upon a knowledge of the laws of the economy, and much practical experience."

It is believed that the principal improvements in the mechanical apparatus for correcting irregularities, since the days of the earlier writers, have been, the introduction of rubber for ligatures (thereby rendering the latter elastic), and of wedges, and, later, jackscrews for obtaining space between teeth or different parts of the dental arch. Rubber was used in this manner almost upon its first appearance in the arts, in the form of strips fastened at each extremity by ligatures. About 1846, Dr. E. G. Tucker employed cross-sections of rubber tubing, which was a material improvement, and is now very much used. Gutta-percha and rubber were used as wedges also, but have been replaced in this direction by wood.

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* A System of Dental Surgery, 1829, p. 417.

† Guide to Sound Teeth, 1836, p. 45.

‡ The Dental Art, p. 103.

In 1857, Dr. Dwinelle, of New York, exhibited before the American Dental Convention the jackscrews he had previously devised for regulating. Since that time others have made various modifications of his apparatus, the principle and mode of operation remaining still the same as in the original.

MECHANICAL DEVICES.

DRYING MOUTH AND CAVITIES.

Nothing, perhaps, indicates more accurately the want of thoroughness and attention to detail in the early practice of the dental art than the total obliviousness to all minutiæ of operating shown by even the best dental writers of over fifty years ago. It may be objected to such a statement, that those writers, actuated in their published works, as they evidently were, by a spirit of general scientific research, did not choose, or considered it unnecessary, to descend to detail, imagining such things to be sufficiently well known not to require remark. But the more probable explanation of this remissness is, that even the foremost dental operators of old did not consider such things sufficiently important to deserve mention. Had they not so thought, they would have given us much more particular accounts of their operations than they have done.

It may be stated as a fact that, until after the introduction of gold foil, absence of moisture from the filling was not, as now, considered of great importance. The first fillings, consisting as they did of lead, and the various gums, were inserted in what would now be called a very careless and superficial manner; and as that manner was not calculated to prevent the after-entrance of moisture around the plug, it will be conceded that its first presence was probably not thought highly objectionable. Koecker,* although treating somewhat elaborately (for the time) of the filling operation, says not a word as to the importance of a *dry* cavity. Fitch† mentions incidentally the wiping out of cavities with locks of cotton; and so, also, Desirabode.‡ As dentistry grew in importance and extent, and its principles became better understood, writers began to treat more particularly of the smaller processes dependent on operations; until all the minutiæ of the dental art received such ample and exact description as is seen only in the published works of the last decade.

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* Dental Surgery.

† A System of Dental Surgery, p. 411.

‡ The Science and Art of the Dentist, p. 281.

Hence it is that the scantiness of information as to detail which has come down to us from more remote periods is due, not so much to want of attention to such processes on the part of the writers as to actual non-existence of the processes themselves in the dental practice of the time.

The napkin was probably the first, and for a long time the only, implement used in securing dryness of the cavity to be filled. This being used in the mouth to prevent access of saliva, that already in the cavity was removed, sometimes by pledgets of cotton, at others by dried and prepared flax, or strips or pellets of linen or cotton cloth. Afterward (1850) Dr. J. B. Rich recommended* the employment of tissue and bibulous paper for the same purpose. Even at this date, however, it was held by some that perfect fillings might be made in the presence of moisture;† and some operators used simply the pressure of thumb and finger to exclude the saliva.‡

Dr. Dwinelle, of New York, described in 1850 his method of operating with a wax *coffer-dam* built up around the tooth.§ The difference between this then-elaborate method, and those mentioned in the previous paragraph, does not by any means indicate any want of ability or operative attainments in the first-noticed practitioners, but serves to show the unsettled and growing state of the art at the time.

In the year mentioned, also, appears the first notice of a saliva-collector observed.‖ The only description of this instrument is given in the citation noted, as follows: "It resembles a miniature fife, and is attached to the under jaw to collect the saliva." In 1854 Dr. R. Arthur devised a "saliva-pump,"¶ which consisted of a bulbed glass tube terminating in a hollow rubber air-chamber, from which the air was driven by pressure, and the saliva drawn into the tube by the return of the expelled air. Several other forms of the saliva-pump have been devised. A noteworthy one is that of Dr. W. H. Dibble, introduced about 1866; this combined the offices of pump and tongue-holder, and also had an appliance for discharging the saliva into any receptacle.** The "latest improvement" in this class of instruments is the "Fisk ejector," designed for use where a tap of swiftly-running water is convenient, as in cities and the larger towns. This is a very excellent apparatus, combining great simplicity with almost unvarying certainty and efficiency of action.

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* American Journal of Dental Science, 2d Series, vol. i. p. 61.

† Ibid., pp. 63, 64.

‡ Ibid., p. 64.

§ Ibid., p. 65.

‖ Ibid., p. 65.

¶ Dental News Letter, vol. vii. p. 192.

** Dental Cosmos, vol. viii. p. 36.

Compressing the orifices of the ducts of Steno and Wharton and those of the various other secretory glands of the mouth was early practiced. In 1857 Dr. Dwinelle used a small tongs of gold wire for this purpose.* Miniature apparatuses on the principle of the truss were also employed. In 1864 Dr. J. C. Parker, of Grand Rapids, Mich., employed disks of biscuit porcelain, to be placed over the duct-openings.† These have now given place to similar disks of pipe-clay.

Tongue-holders were also early in use. That of Dr. Flagg consisted simply in a spoon-shaped metallic plate at the end of a handle held by the patient. One introduced by Dr. E. Townsend (1847) (the invention of Dr. Lawrence, his student) was a watch-spring bent into a semicircle and having pads on the ends,‡ which pressed on the tongue and roof of the mouth. Others of various forms and modes of action have since been invented; most of them holding the tongue or napkins by pressure on the outer side of the lower jaw.

In 1856 Dr. Taft introduced the hot-air blow-pipe in substantially the same form as now used.§

In 1857 Dr. Arthur recommended the use of cross-sections of rubber tubing, to be stretched around the tooth where the cavity extended to or below the margin of the gum. The principle of this, however, is found in the previous wax coffer-dam of Dwinelle, and also in the use of plaster in the same way as Dwinelle's wax. In 1853 Dr. Lord used a "ligature,"‖ or "string-dam," consisting of waxed cotton or silk cord which he tied about the tooth, and forced up against the gum. A modification of this was "Allen's dam;" being the winding of the cord with gold or tin foil so that the foil, when compressed against the side of the tooth, covered its whole surface.¶ About 1860 punk came to be used in place of cotton, flax, cloth, or paper pledgets. The practice with these materials, however, still depends entirely on the fancy of the operators; some using one thing, and some another.

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[*] Dental News Letter, vol. ii. p. 34.

[†] Dental Cosmos, vol. vi. p. 104.

[‡] American Journal of Dental Science, 1st Series, vol. viii. p. 54.

[§] Ibid., 2d Series, vol. vi. p. 555.

[‖] Dental Cosmos, vol. x. p. 242.

[¶] Ibid., vol. vi. p. 13.

In 1864, Dr. S. C. Barnum, of New York, brought forward the now well-known rubber dam. The profession were not slow in recognizing its merits, and in 1870 a call for subscriptions to a "testimonial fund" for the benefit of its inventor was published in the *Dental Cosmos*. The various societies throughout the country added their offerings to this fund, and their thanks to Dr. Barnum for the benefit he had conferred on the profession through his invention. The matter came before the American Dental Association at its meeting in Nashville in 1870, and a gold medal, the expense of which was volunteered by three members, was voted him, with a resolution of thanks and the sum of one thousand dollars.* The California State Dental Association † presented him a gold medal, and the New York Odontological Society, with members of the Massachusetts Dental Society and others, gave him a gold watch and chain and a sum of money. These acts prove the estimation in which this appliance is held by the profession. It is almost universally conceded to rank with the greatest advances in the *matériel* of operative dentistry.

CUTTING AND DRILLING INSTRUMENTS.

From the straight, chisel-shaped excavator and scaler of old to the modern burring engine is such a wide space for progress that the student of dental history would expect to find, between these termini, many and curious developments in the mechanism for boring and cutting tooth-substance; yet there are, in that history, only four divisions or principles of mechanical action to be considered,—1, simple hand-cutters and drills; 2, automatically rotating drills driven by hand-power; 3, the same driven by foot-power; and 4, the same with the power also automatic. Of all forms, except the last, there are or have been several exponents, and all, except the second, are now in use. It is proposed to examine these in the order given above, which is also nearly the order of their appearance in dentistry.

Between those of the first variety now in use, and such as were originally employed, the chief difference is in the size. It is true that there are now many more shapes employed than formerly; but this fact indicates, not change, but addition; nearly all the old shapes being still in existence. The enamel and other chisels are, in many cases, almost reproductions in miniature of those of the carpenter; while the scalers (old, especially) vary in form from the *machete* of the South-American woodman, through modifications of the hatchet and the pruning-hook, to certain tools of the ship-builder. The drills are all delicate tools for metal, as seen in the ordinary single or double-edged "spear-point," the flat "bottoming drill," the round or pointed "counter-sink" (burr), and the new "twist-drill."

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* Transactions American Dental Association for 1870, pp. 26–27.

† Ibid. for 1878, p. 19.

The second principal difference which exists between the cutters of now and then is in the fact that, where now each instrument has its own particular hand-piece, generally one in material and workmanship with itself, it was then the mode to have each *tool* separate, but all fitting into *one handle*, which was generally of different material from the implement, as wood, bone, ivory, or mother-of-pearl. The last two were in the greatest demand, and were often adorned by elegant carving and even with jewels; and instrument-cases were so made as to exhibit, in all their radiant splendor, the then costly implements of the profession to the wondering gaze of the dazzled patient.

The scalers were originally of very much more importance than they now are, and bore a much larger numerical proportion to the cutters. It must be remembered that cutting was at first only little attempted—at least, in comparison with modern practice—and, when done, a few chisels and spear-drills sufficed for the necessities of the operator and of the case. Nothing so clearly indicates the radical change in modern from ancient dental practice as this difference in the comparative value and number of these two classes of implements.

The drill was originally and, for many years (even, in some cases, to the present), rotated simply in the fingers and without guards or any mechanism for the protection of the skin. In illustration of the extent to which this was carried, and of the effects produced by it, we will instance an anecdote of Waite, a very prominent London dentist, in 1820. It is related by E. Parmly, who said that, while in England, and at Brighton, he called on Charles Bew, "a kind of hanger-on, crony and dentist, of the Prince of Wales," who, speaking of Waite, remarked, "My lady —— was with me, and while here she told me that Waite had shown her the *knots* made on his hands in stopping teeth," to which he said he replied, "Lord bless your ladyship, those knots were made on Waite's hands by holding on to the straps of his master's carriage." Dr. Parmly commendably adds, "I hope that we have all learned or shall learn how these callous concretions were made in the hand of the justly celebrated London dentist."[*]

They certainly had sufficient time allowed them in which to do so; for it was not until 1846 that even a partial change in the method of drill-handling was introduced. This consisted in the finger-ring and drill-socket devised by A. Westcott, which was somewhat generally adopted by the younger operators of the time, but for which those who had practiced for years by the old method found, as was to be expected, little occasion.

The above date, however, does not express a time anterior to the introduction of the *drill-stock;* although, prior to it, this instrument was in use, in a crude form, only in isolated instances. But Dr. Westcott's proposed change indicated that the spirit of innovation had arisen; and accordingly we find the drill-stock gradually coming into general use at about or shortly after this period.

The first recorded instrument of this character is that of Dr. J. F. Flagg, of Boston, which, being published (in the Boston *Medical and Surgical Journal*) as an adjunct to his method of root-drilling, has been regarded as invented for, and at the time of, that operation.[†] But Dr. Flagg had it in use before that time, for he speaks, in the article in question, of devising for root-drilling "an appendage to my drill-stock," and also says that, "In most of these operations I have used the simple instrument with which I drill the roots for setting artificial teeth," etc.[‡]

Dr. Flagg's stock was the simple "bow-drill" of the watch-maker. Dr. Maynard devised one in which the drill was rotated by alternately pressing and releasing a stud on the side of the hand-piece, somewhat similarly to the modern automatic plugger of Horne. This was designed to be used by only one hand, as the principal objection to the *bow* form was that it required for operation both hands.

Spencer's drill, introduced in 1849,[§] was on a similar plan; the piston-button, however, being on the end. The tool was at right angles with the body of the instrument, and rotated alternately in either direction as the piston rose and fell.

In 1850, Mr. J. D. Chevalier[||] devised a drill-stock worked by a small crank and bevel gears. The tool was held at an angle of forty-five degrees with the body of the instrument, and could be inserted so as to point, at that angle, either toward or from the handle. The rotation was steadily in either direction according to the will of the operator. This drill required both hands.

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[*] American Journal of Dental Science, 1st Series, vol. iii. p. 5.

[†] See Harris's Dental Dictionary, p. 294.

[‡] See reprint of Dr. Flagg's paper in the New York Dental Recorder, vol. i. p. 121.

[§] New York Dental Recorder, vol. iii. p. 142.

[||] Ibid., vol. v. p. 27.

The same year appeared the drill of Mr. B. B. Alfred,* also worked by a crank and gears, the tool at right angles with the shaft.

The same year was illustrated† the drill (or drills) of C. H. Dubs. These were piston instruments, the tool at right angles.

The same year was introduced the drill-stock of John Lewis,‡ in which the tool could be changed from a line parallel with the shaft to any angular presentation.

The same year came W. W. H. Thackston's drill-stock,§ a bow-drill with the tool at right angles with the shaft.

In 1858 appeared the greatest improvement until that time in drilling instruments,—Merry's drill, the invention of Charles Merry, of St. Louis. This implement is still so well known that it may be superfluous to offer even a limited description. There were two hand-pieces, the one to hold the instrument in place and having at its extremity a rotative tool-holder, and the other to drive the holder, to which it was connected by a flexible coupling or universal joint of spirally wound wire. The tool being presented in any desired position, the driving handle could be held in any direction, and its rotation by the fingers of the other (or, in some cases, the same) hand was communicated to the tool through the flexible joint.

This implement obtained very great popularity, in spite of the many obvious disadvantages inseparable from its use. It may be said to have rendered possible the modern dental engine; for, through its flexible joint, it offered a means for conveying power from a pedal to the hand without interfering with the free motion of the latter. Indeed, the second pedal engine in order of time, and the first to become generally used, included, as its cardinal point, this very feature.

The third division of dental drilling and rotary cutting mechanism commences with G. F. Green's pneumatic engine. This appeared about 1868, and was quite generally used at one time by dentists, especially those of the Western States. The apparatus was worked by a foot-bellows, the air from which proceeded, through a rubber tube, to the hand-piece, where it propelled certain mechanism which rotated the drill.

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* New York Dental Recorder, vol. v. p. 169.

† American Journal of Dental Science, 1st Series, vol. x. p. 203.

‡ Ibid., p. 58, and Harris's Dental Dictionary, p. 221.

§ American Journal of Dental Science, 2d Series, vol. i. p. 101.

The next to appear on the scene, and the first of the "standard" class of engines, was the "Morrison," now so widely used.

This was introduced to the public about 1870–71. It needs no description at this time. There are traditional accounts of a pedal engine invented and used by Dr. John B. Beers, of Rochester, as far back as 1842. It is said that this engine also worked by a coiled steel universal joint. Of this, however, there are no published records; and it can hardly be justly included in the list of dental appliances, especially as it was never used by any except the inventor. The Morrison was the first offered to the general profession, and was very quickly and widely adopted. For some years it had no dangerous competitor, and is now held by many to be the best pedal engine ever devised.

Almost at the same time, Dr. W. G. A. Bonwill devised and introduced his engine. This possesses many points of excellence, and one of its peculiarities is its capability of being converted for the nonce into an office or laboratory lathe. It has, however, never obtained any extended use.

In 1871 was patented Elliot's "suspension" engine. This apparatus presented entire novelty in all things except the fact of the power still being pedal. The hand-piece and tool-holder, suspended by a cord, which was also the driving-cord, by swinging freely in all directions avoided the necessity of a universal joint. The cord was kept tight on the tool-pulley by an equalizing weight and wheel (which has since been replaced by a spring fusee), and the pedal and driving-wheel could be placed in any position. This apparatus is quite extensively used, and is much prized by those who operate with it.

The last, "but not the least" on the list, is the S. S. White engine. This also dispenses with universal joints; but is, like the Morrison, a "standard" engine. The free movement of the hand-piece is obtained by making the whole arm flexible through constructing it of a wire rope of spring temper. At first the strands of this rope were all twisted in one direction; thereby, when hard pressed, ensued what was called "back-lash,"—in less technical language, the rope untwisted. This has been obviated by twisting alternate strands in opposite directions, so that the tendency of part of the arm to untwist is counteracted by the opposite movement of the other part, thus making the arm, as a whole, perfectly rigid in rotating, while as perfectly flexible in lateral or other directions of bodily movement.

This engine is thought by many to be the best of those now in use. One of the principal causes of its success is the spring pitman which rotates the driving-wheel. This form of pitman is the most perfect for light pedal power known to mechanics, causing such equality and steadiness of movement and ease of working as is not attainable by any other form.

The class of dental engines called above the *fourth* is not so, however, in strict order of time of introduction. It is here placed so because it seems naturally the crowning capability to which such apparatus can lay claim, and because the final improvement in engines very probably lies in this direction. The tendency of the whole professional desire as regards this apparatus appears to be toward some method of relieving the operator from personal labor. Many now effect this by the aid of an assistant, but this manner of overcoming the difficulty is not always desirable, and the real solution appears to be in the automatic principle.

The first attempt in this direction was made by Mr. G. F. Green, already noticed as the inventor of the pneumatic engine. This gentleman called to his aid electricity. In 1856, he commenced experimenting in this direction, and after some years of effort partially conquered the difficulties he encountered, and produced the "electrical" burring engine. This peculiar machine is, as stated, not an entire solution of the question of automatic engines. It is heavy, and the peculiar form he gave it renders it unwieldy to use. There is also a lack of power in its operation. When to these serious objections are added the difficulties arising from a want of general knowledge of its principles and motive power, and the attendant trouble in the care of the necessary battery, it is not surprising that this engine never came into any considerable use.

The fact has already been noticed that the tendency of professional feeling, in the matter of engines, is at present toward ridding the operator of personal labor. This is further exemplified by the growing employment of automatic power apart from the engine itself. The applications of this principle in use are mostly (perhaps entirely) either "water motors" or "electrical motors." Of the first there are several kinds, and all seem to give satisfaction. They are, however, only generally available in the cities and larger towns, or where the necessary water power can be obtained; and this will always prevent their introduction elsewhere. The electrical motors are not open to this objection; but they must nevertheless sustain another almost if not quite as formidable; for "the battery" appears as yet to constitute a very great obstacle to their use. And, indeed, even were this overcome, their success, at least for the present, would be doubtful. They are not, in themselves, as yet near to their probable perfection in construction or in principle, and present many objectionable features in their operation. How far these will be overcome remains yet to be seen; in the mean time, they are used in isolated cases, and as experiments, but it would be hazardous to say that they will remain in this position for any great length of time.

FILES, WHEELS, DISKS.

The first instruments used in the removal of decayed dentine, after the *cutters*, were those which operated through abrasion. Of these the first, and until late years the principal, was the *file*. In its first forms this was simply the ordinary mechanical instrument sufficiently reduced in size; but time gave it many changes in shape and method of application, of most of which it will be needless to speak.

The principal early improvements were those of Dr. E. Townsend, of Philadelphia, one of which was designed for the adaptation of pivot crowns to the roots. This was secured by making two companion files, one convex, the other concave, both of the same curve; the former used on the crown, and the latter on the root. Dr. Townsend also devised a set of "finishing files" in the form of a straight or curved smooth central portion (for a handle), carrying at each extremity thin curved, oval, and other shaped file-blades. These files still form part of every dental outfit.

Dr. Harris, of Baltimore, in 1833, originated a form of file for the separation of molars, to avoid the then common use of the file-carrier for this purpose.* These were about one and one-half inches in length, shaped like a clock-pinion file, and having a handle-like continuation, bent twice so as to form an offset with the hand-part projecting beyond. These files are also still in use.

The loss by breakage of these fragile instruments, and the general difficulty experienced in applying the ordinary forms to the molars, induced the invention of the *file-carrier*. The first recorded form of this instrument is that devised by Dr. A. Westcott, of Syracuse.* It consisted of a handle and double-curved arm (to bring the file again in line with the handle); from the extremity of which projected laterally two short, mortised pieces between which the file was fitted; the portion of the arm between these pieces being a spring, which, by its elasticity, kept the files in position. With this instrument it was necessary to prepare the file by forming tenons on its ends to fit the mortises in the arm-pieces. This file-carrier was the first in which the files were held by their extremities.

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* Harris's Dental Dictionary, p. 281.

In 1848 Mr. J. D. Chevalier introduced another form (on the main principle above named), which precluded the necessity of preparing the files especially for it, and allowed the use of broken portions of files, being adjustable for that purpose.† One portion of this instrument, the arrangement of the file-holding buttons, which allowed the placing the file at any perpendicular angle, was the invention of Dr. W. H. Elliott, of Montreal, and is worthy of notice.

Since the last date various modifications of the file-carrier have been introduced. We shall notice, however, only the last,—that of Mr. E. T. Starr,—which is designed for use with the S. S. White engine. This is a simple and compact device, the reciprocating motion being obtained through a crank movement operated by the rotating flexible arm of the engine.

The introduction of wheels or disks into operative dentistry is quite recent, being necessarily dependent on the advent of the burring-engine; but the date of first use of revolving cutters cannot be determined. Dental wheels or disks probably grew imperceptibly and simultaneously in many hands from the saw burr. The various grinding stones were first used, and were succeeded by the shellac-and-emery composition, which, in turn, has given way to the corundum wheels of Drs. A. L. Northrop and R. Arthur, now so universally known and used. A still later addition to the list is the disk of W. G. A. Bonwill, a compound of rubber and corundum worked into shape and afterward vulcanized.

In certain circumstances the presentation of a disk or wheel on a straight mandrel in the desired position is difficult, and apparatuses have been devised to meet this objection. The principal of these is the disk-carrier of Dr. Hickman, which, at some slight cost of inconvenience, meets most conditions. Another form, very lately introduced, for use with S. S. White's engine, appears to be an improvement. In Hickman's the presentation of the disk is rendered variable by a simple mechanism which admits of lateral movement at several angles, but which must be adjusted while not in use. In White's the disk runs immovably at a certain angle with its shaft, and changes in its position are instantly secured by simply rotating the shaft or hand-piece without ceasing to drive the disk. A valuable addition to this instrument is a collar, pressure on which instantly stops the motion of the disk, while the engine may continue its speed.

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* American Journal of Dental Science, 1st Series, vol. vii. p. 293.

† New York Dental Recorder, vol. iii. p. 1.

FILLING INSTRUMENTS.

General regard as to variations of form, size, purpose, or adaptation of filling instruments is a thing of comparatively modern growth. It was thought, even fifty years ago, that almost any straight, stiff tool was sufficient to the placing of any filling which it would reach, and for those not accessible by such, a curve in the shank quickly rendered the instrument a proper one. It must be remembered that, at that period, almost the only cavities filled were in the crowns or readily-accessible surfaces of teeth. Approximal decay was almost invariably removed by the file, which, of course, left no cavity behind it.

It was believed that much force was necessary in order to properly condense a filling, and the instruments were made correspondingly strong and broad-pointed. They were generally entirely without serrations, and with large and strong handles.

With the advent of "sponge" or "crystal" gold an impetus was given to the invention of new forms of filling instruments. Dr. Dwinelle devised a set for the particular manipulation of this form of gold. Previously, however, many additions of shape had crept in quite insensibly, as it became the vogue to form and fill proximal cavities.

As the culmination of the idea of necessarily great force in introducing fillings, "plugging forceps" made their appearance. These were, at first, simple and of limited variety; but they soon took on many forms, and were very extensively used for a time. The most marked variation in them was the swivel fulcrum and changeable points, introduced about 1842.

An illustration of the extent to which the "force" idea was carried will be found in the experiments of Dr. J. D. White, as late as 1850, with a *dynamometer* constructed for the purpose.* This gentleman found that the estimates of dentists in general as to the degree of force used by them in condensing a filling were much too high. Some boasted that they often applied from sixty to eighty pounds' pressure on a filling. Dr. White corrected this estimate by sending his dynamometer to the muscular operator; who thereupon found that he had been using only about twenty-five pounds' pressure. Dr. White says,† "It is a difficult matter for us to apply more than ten or twelve pounds' pressure on a superior molar of a patient of that many years of age, or a nervous and yielding patient. . . . But when we have an older patient, or a hard head and stiff neck, and a molar well set in a well-developed jaw, and the patient firmly seated in the chair, we can apply as much as twenty-five, and even, in some cases, thirty pounds."

The introduction of cohesive foil rendered necessary a radical change in points in general. This change consisted in the serration of the points. At first, for *serration* read *toothing;* for Dr. Arthur recommended "two or three" points or teeth as being the proper number. These were large and deep in the original forms, but grew smaller and more numerous as experience revealed their frequent breakage and other disadvantages. The points of pluggers, in fact, have gone through the range of intermediates between smooth and blunt, and sharp and *single*-pointed, and back again. From the first form to two or three deep serrations was an easy step; and some went further and converted the few sharp teeth into one,—in other words, they *pointed* their pluggers. These were extreme cases, however, and not general. The main tendency was from a few deep serrations to a multiplicity of shallow ones, and at this point the majority of the profession now stands. The extremists of to-day are represented again by perfectly smooth points; and one gentleman has advocated the use of *ivory* pluggers.

The most radical change in the filling of teeth has been wrought by the *mallet.* The introduction of this instrument has been erroneously ascribed to Dr. Wm. H. Atkinson, of New York; in fact, Dr. Atkinson *revived* the use of an old and discarded implement. Koecker,‡ writing in 1826, thus expresses his disapprobation of a certain class of operators: "But what is more surprising and repugnant, after the tooth is thus prepared for the reception of the stopping, some operators actually employ a *hammer and punch* to drive the metal into the cavity of the tooth. I have seen the most alarming consequences proceed from this barbarous practice, particularly in the cases of several ladies who consulted me in Philadelphia.[*] Many of their teeth, especially the incisors, or front teeth and cuspidati, had been plugged in this manner. Some of them had already lost their vitality, and were discolored when I saw them, and others were so tender, from the violence that had been used, that the least pressure upon them caused exquisite pain." It is evident from the above, that if Dr. Atkinson cannot be accorded the primary employment of the mallet, yet he deserves credit for teaching its use in a less "barbarous" manner.

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* Dental News Letter, vol. ix. p. 100.

† Ibid.

‡ Principles of Dental Surgery, London, 1826, p. 399.

Fitch also (1829),[†] following Koecker, mentions a case of *splitting* an incisor tooth by the use of the mallet; and concludes by observing that he is "persuaded that no judicious surgeon-dentist will ever adopt this very objectionable mode of performing the operation."

The first official recorded explication of the use of the mallet by Dr. Atkinson was in 1861, before the Pennsylvania Association of Dental Surgeons. The editor of the Transactions mentions[‡] the "entertaining and instructive character" of the proceedings, and names as "the principal objection" to its employment "the necessity of always requiring an assistant to use it properly." This objection was soon found to be one of semblance and not of reality. The American Dental Association, at the meeting of 1866, passed a resolution of thanks to Dr. Atkinson "for the introduction of the mallet in dental practice, and for his kind and efficient teachings in its use."[§] In acknowledging this recognition, Dr. Atkinson referred his first knowledge of the instrument to Dr. E. Merrit, of Pittsburgh, in 1838.

Upon the introduction of the mallet, the attention of dental inventors was immediately turned toward making the principle automatic. Who was the first that presented such an instrument it is exceedingly difficult (and perhaps impossible) now to determine.

In quick succession (not here exactly given) appeared Foote's, Taylor's, Horne's, Salmon's, and the Snow & Lewis automatic pluggers, all on the spring and (except Horne's) "touch-blow" principle; Baxter's and Pomeroy's, also spring instruments; Bannister's, Green's, and Gaylord's, on the pneumatic principle; Buckingham's, operated by the White dental engine; and the "electric mallets" of Green, Bonwill, Jack, and Webb. The possibility of such a list was certainly not contemplated by Dr. Koecker when he deprecated the use of the "hammer and punch."

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[*] As Koecker left Philadelphia for England in 1822, the use of the mallet in this country is therefore considerably anterior to that date.

[†] A System of Dental Surgery, New York, 1829, p. 410.

[‡] Dental Cosmos, vol. iii. p. 258.

[§] Transactions of the American Dental Association, 1866, p. 242.

Those of the above which are first named as on the spring and touch-blow principle, have been more largely used than any of the others. In particular esteem and widest employment are held the Salmon and Snow & Lewis pluggers. Horne's is a very excellent instrument, though but few have ever been made. Baxter's is a quaint device, allowing the use of the ordinary plugging-tool. Pomeroy's is well recommended. Bannister's and Green's pneumatic pluggers never were widely used. Gaylord's is a new device, and may be operated either by a foot-bellows or bulb, or by attachment to the Morrison dental engine. Buckingham's is attached to the White dental engine, which is run the same as for burring.

Green's electric mallet has proved inefficient for general use. Bonwill's was the first to be introduced which attained to some considerable employment. That of Dr. Louis Jack, which he has generously given to the profession, presents novelty of action and mechanism. The last introduced is that of Dr. Webb. This is a modification, in essentials, of Bonwill's instrument, but much lighter and somewhat easier of manipulation.

Of this class of instruments it may be said, as of electrical motive power in general, that it is not yet near perfection. The field for improvement is very wide, and will eventually be thoroughly cultivated. It is an encouraging indication for the future of electrical plugging instruments, that there is a very general verdict in favor of their character of blow and operation over all other devices for the same purpose.

INSTRUMENTS FOR EXTRACTION.

The forceps is probably the oldest tooth-extracting instrument known. A leaden forceps was placed in the temple of Apollo at Delphos, by Erasistratus, 300 B.C.; and Celsus mentions it as an implement of extraction 100 B.C. The first form of the tooth-forceps was that of the ordinary mechanical instrument so named; and it continued thus, with very slight (if any) variation, for hundreds of years. In fact, the first idea of improvement in tooth-extractors seems to have been toward the production of a new instrument rather than in the improvement of the forceps. The *pelican* (which much resembled the *skid* used by lumbermen) was the first form taken by progress in this direction. From the pelican grew the *key* of Garengeot, invented early in the eighteenth century.

The pelican has been known in this country only as a curiosity. The key, however, has obtained here, as everywhere, a very extended use.

The key was first made with a straight shank or handle, but the double elbow was afterward added, both to clear the interfering teeth and to add power. Various other improvements have been made, chief of which are, the movable attachment of the hook, which allows changes of hooks to suit different cases, and the form and position of the bolster or fulcrum. The principal advances in the latter direction have been, first, making the fulcrum round; and, second, making it movable.

This instrument, however, has long since almost fallen into disuse, the great disadvantages attendant on it being almost entirely abrogated by the employment of the improved styles of forceps.

Of the punch and elevator it is hardly necessary now to speak, except as noting the fact that they were considerably employed in the early days of American dentistry. They still form part of complete sets of extracting instruments, but are little employed.

The forceps has undergone so many changes that it will be impossible to notice more than the most prominent. Like the tortoise in the fable, this instrument began in the race of improvement with a fair start, and was at first outstripped by the temporarily more favored turnkey; but it has succeeded in at last driving all its competitors from the field, and is now almost the only instrument used for the extraction of teeth.

The first reasonably complete set of forceps recorded was the work of Dr. J. F. Flagg, in 1828. These were very largely used, and some of the forms are still employed. Physick's forceps, a combination of the lever and wedge, form even now a part of every complete set, and are sufficiently well known to require only slight description. His improvementwas in constructing the beaks like two curved inclined planes, opening laterally, and intended for the wisdom-teeth. Maynard's improvement consisted in placing a point on the outer jaw of the instrument "for perforating the alveolus between the outer roots of the teeth"* (upper molars). Elliot's key-forceps had the beaks of a pair of forceps and the handle of the key, "one beak serving as a hook, while the other is represented by a movable fulcrum."* Elliot, Pease, and Chevalier each devised excising and dividing forceps.

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* Harris's Dictionary of Dental Science, p. 302.

In 1844 Dr. S. P. Hullihen described, in the *American Journal of Dental Science* (vol. iv. p. 254), a combination of screw and forceps which he had invented. This instrument, designed only for the extraction of roots, was much esteemed, but was capable of improvement, which was added by Mr. J. D. Chevalier in 1847† and by Dr. C. H. Dubs in 1848, the latter being patented in that year. Upon the introduction of Dr. Dubs's patent, he claimed (or had claimed for him) at least *all* the credit to which he was entitled for his invention; and a controversy was initiated as to the addition of the spring and ratchet,—which constituted the improvement claimed by Dr. Dubs, and was claimed by J. D. Chevalier. It soon died out, however, and Hullihen's and Dubs's screw-forceps are now in use, each for its proper cases and under its own merits.

Colburn's adjusting forceps was introduced in 1851.‡ This improvement consisted in a capability of elongating either beak, for adaptation to such teeth as were decayed on one side so far below the gum as to afford a very uneven and precarious hold to equal-beaked instruments.

The above are believed to be the principal variations in this instrument devised in this country. The present forms embrace almost every possible variety of style, hold, beaks, presentation, and capability of use.

The screw has attained to a considerable use in such cases as are suited to it. These are somewhat rare, however, and this cannot be considered a very common instrument. We shall mention only one of its variations, comprised in the screw of Dr. C. S. Dickinson. This remarkable invention is figured on page 119 of the fourth volume of the *New York Dental Recorder*, but is extremely difficult to describe without illustration. We may say, that it pretty closely resembles that variety of *cork-screw* in which the screw moves in a tube which rests on the neck of the bottle, and into which the cork is drawn by a secondary screw, the latter being replaced, in Dr. Dickinson's invention, by a lateral ratchet and handle. We cannot learn that this somewhat complex instrument ever obtained any very extended use.

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* Harris's Dictionary of Dental Science, p. 425.

† New York Dental Recorder, vol. iv. p. 62.

‡ American Journal of Dental Science, 2d Series, vol. ii. p. 113.

THE OPERATING CHAIR.

This important accessory in operative dentistry is (at least as now seen) a comparatively modern invention. The dental chairs of one hundred, and even of fifty years ago, differed very slightly from the ordinary domestic article, and that difference existed only in isolated instances, the main addition being some provision at the back for the reception of the patient's head. No provision was made for any alteration in height or other position. Many practitioners of early days, to secure some measure of the latter capability, used an ordinary rocker, which was susceptible, at least, of forward and backward movements.

A particular description of the improvements in this article will not be attempted, as such would be of slight value, in any case, and also mainly unintelligible without illustration. Only the principal advances toward present perfection will receive attention.

As has been stated, the first step in the adaptation of the ordinary household article to dental purposes was the addition of a head-rest, which was first fixed, and then movable in a forward or backward rotation. The universal movement is the invention of comparatively late years.

The next necessity discovered and supplied, was the capability of change of height of the seat; and many and curious have been the devices for the production of this effect. Almost simultaneously variation of position, first of the back and then of the seat, was effected.

The first chair which seems to have contained all these improvements was that of M. W. Hanchett. This chair had a central supporting screw under the seat, to which the screw was hinged by gudgeons at the ends of horizontally-projecting arms, thus allowing the tipping of the seat and back backward and forward on these gudgeons, the whole being held in the desired position by notched iron semicircles playing in a cogged wheel controlled by a winch and ratchet. The elevation was accomplished by turning the seat on the screw after the manner of a piano-stool.* This chair was introduced in 1848.

In 1849, F. Searle, of Springfield, Massachusetts, constructed a curious mechanism for the raising and lowering of the seat.† The upper part, consisting of seat, back, and arms, was separated from the legs and lower frame by an intermediate frame, the back part of which was hinged to the lower back edge of the seat, and the front part similarly attached to the upper front edge of the leg-frame. By tipping the seat on the front hinges it was inclined forward, the back hinges not then being able to act, and the reverse movement was secured by the back hinges; and when both hinges were operated the effect was to raise the whole seat vertically, the intermediate frame then taking the same position, with regard to the seat and leg-frame, as that of the diagonal stroke to the horizontal ones in the letter Z. The different positions were attained and held by cogged iron quadrants.

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* New York Dental Recorder, vol. iii. p. 47.

† Ibid., vol. iv. p. 75.

In the chair of C. H. Eccleston, the seat was placed on powerful steel springs, the tension of which was upward, and a vertical rod was attached to the centre of the under side of the seat and passed between two guides, in one of which was a strong set-screw. When this screw was loose, the springs at once elevated the seat to its highest point, drawing up with it the rod, which altitude could be reduced by *pressing the seat downward,* and fastening it in the desired place by tightening the set-screw on the retaining rod. The weight of the patient must have been a considerable factor in the operating of this mechanism. The back tipped forward or backward on a hinge-pin passed laterally through its lower portion and the tops of the posterior legs.

In 1850, Mr. J. D. Chevalier, of New York, invented and sold a "portable head-rest," for attachment to any ordinary chair. This was not only extremely convenient for itinerants, but it was also perhaps the most complete head-rest then in use. It was susceptible of backward, forward, and lateral rotating movements, and of being raised or lowered vertically; all of which cannot be said of any other dental head-rest of the time.

These are examples of the modes of progress toward the present status of the dental operating chair. It is not necessary to speak of the various elegant and ingenious modern articles. The Archer, Perkins, Morrison, Harris, O. C. White, and other forms are universally employed, and their excellencies everywhere acknowledged,

TREATMENT OF THE MORE IMPORTANT DISEASES, INJURIES, AND NATURAL DEFECTS OF THE ORAL CAVITY.

In former sections have been considered the methods of practice which have been, from time to time, adopted in the more common abnormal conditions which occur to the teeth. In this will be cursorily reviewed the principal methods of treating the rarer cases of disease and natural defects in, and accidental injuries to, the mouth and associate parts.

In doing this, it is no part of the design to include the labors of the surgeon *per se* in these directions, although it is very difficult to exclude them entirely; but to present only such operations as may be said to belong to, and be a part of, the possible operations of the dental practitioner.

In the earlier years of general, as well as of American dentistry, there seems to have been a feeling that professional aims should be in the direction of surgery, rather than of the parent branch, medicine. This is evidenced in many ways; not the least of which is the appellation of "surgeon-dentist," or later, "dental surgeon," which was the self-given distinction of what was, in reality, a craft and not a profession. Then, as now, truly surgical practice was confined to a few of the name; the large majority of oral-surgical cases being managed by the general practitioner. Hence it is, that in the writings of our older dentists, although they are named, almost universally, treatises on "dental surgery," there is found little of value,—indeed, often nothing,—pertaining to such lesions as are indicated by the above heading; and for the surgical treatment of the more serious oral diseases, reference must be had to the literature of that specialty, or of medicine.

Into the causes of this it is not here necessary to inquire. The fact itself forms the excuse for paucity in accounts of such cases and methods of treatment as would have sanctioned to the dentist of old, had he received and practiced them, the use of the title he had adopted as representative of his professional status.

Confining the consideration of the general subject strictly to American authors, the first to be noticed will be the few principal *diseases*, such as tumors, fungous growths, and lesions of the antrum.

Woofendale, although his book was published in London, has in this work always been included in the list of American dentists, since he spent a considerable portion of his professional existence here. Of disease of the antrum he writes,*—"I am of opinion that this complaint rarely happens from any other cause than the inflammatory tooth-ache, extending or being confined to the periosteum of the socket, which terminates in suppuration, and penetrates and discharges into the *antrum maxillare*. . . . By (a case stated) I am led to suspect, that a caries of the palate bone may sometimes be the result of the inflammatory tooth-ache from the lodgment of matter [pus] (as in the case here related); which, when in an acrid state, from confinement, and in length of time, may frequently injure and destroy this bone." This dentist treated the case of which he speaks (abscess of the antrum of Highmore) by extraction of the second molar and piercing its socket with a probe, and topical application of some remedies which he does not particularize. This single disease and case is the only one he mentions which appears to take rank out of the ordinary character of daily practice.

James directs† "decoction of bark, or diluted tincture of myrrh to be frequently injected into the cavity" of the antrum, through an opening in the socket of the second molar.

L. S. Parmly writes,‡ "When the inflammation of the teeth and gums of the upper jaw is long continued and very considerable, whether proceeding from accident, or from the natural effects of disease, it is often communicated to the lining or investing (membrane of the) maxillary sinus. . . . As soon as the symptoms of this disease are discovered (a fact exceedingly difficult to ascertain till matter is actually formed), the great point is to give it a free opening or discharge. The readiest way of doing this, is to extract the middle grinder or *molares*, the situation of which is immediately under the maxillary cavity, and afterwards to pierce through the socket with

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* Woofendale on the Teeth, p. 61 *et seq.*

† A Treatise on the Management of the Teeth, p. 121.

‡ A Practical Guide to the Management of the Teeth, p. 170.

[illegible] the gums. The opening thus made should be [illegible] and detergent applications occasionally [illegible] every appearance of discharge sub- [illegible] independent of the diseases of [illegible] the lodgment of worms or [illegible] ova, or eggs, de- [illegible] drawn in with the breath [illegible] the antrum. Their removal [illegible] the operation above men- [illegible] they are entirely [illegible]

[illegible] as follows: [illegible] of the [illegible] moved." To the list of the various diseases to which the term *epulis* has been applied, Dr. Parmly adds alveolar abscess.*

Josiah F. Flagg writes,† in relation to tumors, "Preternatural enlargements of the gums are not uncommon. They proceed from various causes, but generally from diseased teeth, and are seldom to be cured till these are extracted. Tumors of the gums are either of a soft, spongy texture, or of a more firm and fleshy nature, sometimes nearly of the consistence of cartilage. . . . The hard, fleshy, or cartilaginous tumors are not so common as those of the opposite nature; but their consequences are much more to be dreaded if they are not early extirpated. . . . In all these cases the speedy removal of the tumor (by the use of caustics, the ligature, or the knife) is the only plan of treatment on which we can reasonably hope for success. In some instances, however, the laceration produced by extracting teeth which were enveloped in such tumors has proved an effectual remedy."

Dr. Koecker, under the head of "Effects produced by dead teeth and stumps,"‡ etc., sums up an enumeration of cases of tumors and carcinomatous growths as follows: "The only method of cure for all the idiopathic and symptomatic maladies, whether general or local, occasioned by dead roots and teeth, is their immediate extraction, they being always the principal and proximate exciting causes of the disease."

Thomas E. Bond, in his work, "A Practical Treatise on Dental Medicine" (Philadelphia, 1851), treated this subject more fully than any previous American dental writer. Following are some extracts, which sufficiently explain themselves:

"*Fungus Hæmatodes*, etc. This disease is almost uniformly, perhaps always, a constitutional one, and therefore beyond the reach of any local means." "Sarcomatous or fleshy tumors, ... if permitted to pursue their natural course, sometimes suppurate and then subside. This mode of cure, however, involves so much inconvenience, that it is commonly better to extirpate them." "The term epulis is applied to different excrescences seated upon the gum. . . . They are generally caused by carious teeth, whose fangs keep up a continual irritation in the neighboring parts, and are sometimes traceable to neglected *parulis* or gumboil as their immediate cause. . . . Without removing these irritants, of course no permanent cure can be expected. . . . Of whatever kind . . . . tumors may be, they should be carefully watched. So long as they cause no inconvenience they may be let alone; but if, by reason of growth or any other cause, they begin to inflame the surrounding parts, or to become painful during the movements of the jaw, or contact with air or food, they should be extirpated. If pendulous and accessible, a ligature or the knife may be used; but if broadly based and fully incorporated with the gum, and but small in size, caustic should be used." Of what has been called "dropsy of the antrum," he says, "The term dropsy is entirely misapplied to this affection, and should be discarded. . . . The affection we are considering is a distension of the antral cavity by retained mucus. . . . The indication, of course, is to make an artificial opening and permit the escape of the contained matter, and then to make such applications to the lining membrane of the antrum as will restore the natural secretion of the part." "With regard to the treatment of antral polypi, it resolves itself simply into making an opening into the sinus and removing the tumor." "That the larvæ of insects find their way into the maxillary sinus is proved by abundant evidence. . . . Should worms be found in the cavity, they must be destroyed by the injection of oil or other liquids likely to effect the purpose."

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* Loc. cit., p. 96. † The Family Dentist, p. 58. ‡ Dental Surgery, p. 259.

Dr. Harris, writing of tumors of the gums,* says they "seldom arise spontaneously, but are, in most instances, the result of local irritation, occasioned by the presence of tartar, decayed or dead teeth, or roots of teeth; but the character which they assume is determined by the state of the constitutional health or by the habit of body of the individual. Hence their great variety. . . . We do not conceive it necessary to the production of tumors, that any of the causes here enumerated should exist at the time they make their appearance. The gums and alveoli having been once affected, are ever afterward more susceptible to morbid impressions. It is therefore quite probable that an unhealthy action is sometimes continued in them long after the cause that produced it ceases to exist; and that this . . . . determines their development." "When the base of a tumor is very broad, and the bone beneath carious, ... the actual cautery is, without doubt, the surest remedy, because it is obvious that until the diseased bone is exfoliated a cure can never be effected. But under no other circumstances is the use of it advisable. . . . In the treatment of tumors originating from the gums, or alveolar processes, or from both, much depends on their character and the constitutional symptoms accompanying them. Some may be entirely removed . . . . by simply extracting a decayed tooth or root; others will require extirpation, and, in some instances, even this will not avail."

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* Principles and Practice of Dental Surgery, Philadelphia edition of 1853, p. 452 *et seq.*

With reference to diseases of the antrum, this author writes, "This cavity is subject to some of the most formidable and dangerous diseases the medical or surgical practitioner is ever called upon to treat." Others, however, "are very simple and easily cured," but may, through neglect, assume a dangerous character. "While, on the one hand, the most simple affections of this cavity may, by neglect or improper treatment, ultimately become incurable; those on the other, which are considered the most malignant and dangerous from their inception, might, we have no doubt, by timely and judicious treatment, be effectually and radically removed." "The morbid affections of the maxillary sinus are, for the most part, similar to those of the nasal fossæ. There is, however, a form of disease which seems to be peculiar to this cavity, viz.: mucous engorgement." After enumerating various other diseases of the antrum, and the causes generally ascribed for them, he continues: "If all the circumstances connected with the history of the diseases under consideration could be ascertained, we think it would be found that these affections are more frequently induced by a morbid condition of the teeth, gums, and alveolar processes, than by any other cause."

In considering the curative treatment of diseases of this cavity, Dr. Harris examines thoroughly into the origin of the methods of entrance thereto; and determines as follows: "When the natural opening is closed, ... a perforation should be made into the sinus, and the most proper place for effecting this . . . . is through the alveolar cavity of the second molar. It may, however, be penetrated from that of either of the other molars or bicuspids."

The American writers on this subject since the date of Harris's work have been few, and are sufficiently well known to make any exposition of their views unnecessary.

The treatment of accidental and other oral injuries will now be shortly reviewed.

In the earlier time of American dentistry such cases were always referred to the general surgeon, the dental operator not undertaking them; but the sphere of dentistry widened somewhat, and at present simple accidents, as luxations, fractures, etc., of the jaw are not uncommonly treated by the dentist. Evidence of the comparatively modern character of such additions to ordinary dental practice, may be found in the fact that Dr. Bond, who wrote in 1851, is the first American writer of note who incorporated, together with strictly dental lesions, a consideration of cases, as wounds and the more serious diseases, which had before been considered to belong to general surgery. It is true that this date does not express the first, or even very early attention paid to the subject by dentists. A few among them, having received proper preliminary education, were competent to, and did, perform many very severe and extensive surgical operations, long before it was even considered needful that the general practitioner should understand them. Among such, the name of S. P. Hullihen will always be remembered, as a surgeon of the first grade as well as an excellent dental operator. But, in spite of these instances, the writing of Dr. Bond is the first indication of an extended sphere for general dentistry.

Although the simpler operations in general surgery pertaining to the oral cavity and adjacent parts are now performed by many dentists, it cannot be said that more complex or difficult cases are yet much attempted in our specialty. As an instance of what has been and may be accomplished by the properly educated dentist, and in conclusion of this part of the subject, a case of Dr. Hullihen's will be cited, which was perhaps the most difficult and extended on which any American dental surgeon has ever operated. In the words of Dr. Harris, "the ingenuity, skill and boldness displayed in the conception and performance of this complicated operation, place Dr. Hullihen at once among the ablest surgeons of the day."

The injury was a very severe burn, "principally confined to the neck and lower part of the face, and its cicatrix produced a deformity of the most dreadful character. Her head was drawn downwards and forwards, the chin was confined within an inch of the sternum, the under lip was so pulled down that the mucous membrane of the left side came far below the chin, the under jaw was bowed slightly downward, and elongated particularly in its upper portion, which made it project about one inch and three-eighths beyond the upper jaw. In front there was scarcely any appearance of either chin or neck. She was unable to turn her head to either side, the cheeks and upper lip were dragged considerably downward; she could not close her eyelids; she could not close her jaws but for an instant, and then only by bowing her head forward. She could not retain her saliva for a single instant; and, as might be expected, her articulation was very indistinct."

This formidable case had been further complicated by an unsuccessful attempt on the part of other surgeons to so dissect up and move upward the cicatrix on the neck as to allow of motion to the head and jaw. The manner in which Dr. Hullihen proceeded is shown as follows, condensed from his own graphic account.*

"After a careful observation of the case, it became evident that such a complicated deformity could be best remedied by performing three separate operations: one upon the jaw, another upon the neck, and a third upon the under lip. To remove the projection of the under jaw seemed to require the first attention. . . . This lengthening of the jaw had taken place entirely between the cuspidatus and first bicuspid tooth of the right side, and between the first and second bicuspids of the left. By the elongation the teeth just described were separated on both sides about three-fourths of an inch." The reduction of this protrusion was effected by sawing out the elongated portions in a V shape, the point downward, and then cutting horizontally through the front part of the jaw to the point of the V, thus severing the whole upper three-fourths of the jaw, the piece containing six teeth. In doing this the bone was not detached from the soft parts, which thus held it in connection with the remainder of the jaw. The corner angles of the severed part being removed by nippers, the bone was "set back so that the edges from which the V-shaped sections were removed came together." The piece was retained in position by a silver plate struck up and fitted over the teeth and gum. "The gum healed in a few days, and the jaw united strongly."

The second part of the operation, the division of the cicatrices which held the head in a fixed position, was effected by cutting boldly through them, "making a wound upwards of nine inches in length and nearly five in width." A leather pattern of this wound was laid on the shoulder and arm over the deltoid muscle, and a flap of the same form and dimensions was marked out and dissected up "as thick as the parts below would admit," having an attachment or neck two inches wide. "This flap was now brought around and secured in the wound on the neck," and the wound in the shoulder was partly drawn together and partly covered with lint. The patient bore this tedious and painful operation with great fortitude; the flap united by the first intention; and in about six weeks all was healed, and the head and jaw free.

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* American Journal of Dental Science, 1st Series, vol. ix. p. 157.

[illegible] great deformity of the lower lip was effected [illegible] V-shaped portion of sufficient extent [illegible] resume its former [illegible] depression of the upper [illegible] the V out of the lip.— [illegible] level with the re- [illegible] The original de- [illegible] still bearing [illegible] jaws, [illegible] particular [illegible]

[illegible] and finally claim [illegible] and important [illegible] connected with it [illegible] It may be divided [illegible] and me- [illegible] the first is by the [illegible] many [illegible] attempted by [illegible] those unassisted [illegible]

[illegible]

"exert a far greater morbid influence upon the system in general, as well as upon the living teeth, ... than any other artificial parts used in surgery, ... even when inserted under the best surgical principles." Spooner[*] makes only slight reference to palatine deficiencies.

Dr. C. A. Harris was the first American author to devote especial and detailed attention to this subject.[†] Following are some extracts: "It is of the greatest importance that an artificial palate or obturator should be executed in the most perfect manner, and be made to fit accurately all the parts with which it is to be in contact, so that it may not produce the slightest irritation, or exert undue pressure upon any of the superjacent or surrounding parts." "When the opening in the palate is small, and has no connection with the velum, it is seldom necessary to raise the upper surface of the plate by attaching a drum or air-chamber to it." This air-chamber or drum was a comparatively modern method of obturating extensive cavities in the palate. The older method, which is mentioned only cursorily and as historical, by Dr. Harris, was to attach a sponge, larger than the orifice in the palate, to the upper surface of the plate, and force it through the opening, where it was swelled by the absorption of moisture and secretions, and not only filled the cavity, but held the plate in place also. Not the least of the objections to this method was the offensive odor of the sponge when filled with mucus and moisture. But it was subject to a graver defect; for its action on the edges of the opening on and against which it rested and pressed, was to enlarge and increase the already existent defect. The objection of its offensive odor was obviated by the substitution for it of a metal appendage to serve in the same manner and for the same purpose; but this, while destroying the lesser evil, only increased the greater. It was not until about 1820, in this country, that the supporting of obturators and palate-plates was generally effected by clasps around the natural teeth, and somewhat later by atmospheric pressure.

In cases of complication of palatal openings with loss, wholly or partially, of the velum, a much more complicated apparatus is required than the simple obturator. Foreign dentists were quicker in arriving at desirable results in this direction than American. Dr. Harris describes a contrivance of Delabarre's in a case of this kind. It "consisted of a metallic plate bent in the form of a horse-shoe, and occupied the place of the posterior part of the naso-palatine floor; the nasal portion was grooved for the reception of the vomer."

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[*] Guide to Sound Teeth, 1836. [†] Principles and Practice of Dental Surgery.

To the posterior portion was affixed "a piece of caoutchouc resembling in shape the form of the velum and uvula." The whole was secured in its place by clasps around the first molars.

The principle thus enunciated by Delabarre is that on which the only generally successful subsequent "artificial palates" have been constructed.

Dr. S. P. Hullihen invented a form of apparatus for use where the velum had been lost by disease, with a view to restoring the air-passages to their normal condition. It consisted of a gold plate struck up to fit the roof of the mouth, as usual, and having on its under or lingual surface two small staples, in line with the axis of the arch, which held, and through which could be slid, backward or forward, a "slider" of gold plate, about one and one-half inches in length, and one-eighth in width, and having on its anterior end a button, which prevented its being drawn or pushed from the staples, and allowed the placing at will in the necessary position of the apparatus which was attached to its posterior end. This consisted of a fine spiral spring in line with, and a continuation of, the "slider," and had fastened to it on each side the double semi-globular metal valve, designed to admit of the ingress and egress of the desired volume of air. By the slider the wearer adjusted the valve to its proper position, where it vibrated in inhalation or exhalation upon the spiral spring.

By far the greatest improvement in this class of apparatuses which had been produced in this or in any country, was the artificial palate of Dr. Charles W. Stearns, invented about 1843–4. Dr. Stearns then a resident of Springfield, Mass., and a graduate of medicin was himself afflicted with a congenital cleft palate. The failure his case of two or three surgical operations, induced him to endeav to remedy the defect himself mechanically.

At that time and place, Mr. Goodyear was conducting his expe ments with rubber, and Dr. Stearns, being acquainted with Go year and his material, used the latter for his palatine substitute. was almost entirely without knowledge of dentistry. He oper upon himself, took his own impressions (*with bits of wax on the of a stick*), and vulcanized the rubber portions of his applian *moulds cut or carved from wood blocks*, according to the fragme impressions mentioned, with his own hand. Yet, despite the fest and extraordinary difficulties encountered through [illegible] laborious, and extremely unreliable methods, he successful that, when using his appliance. in quaintance,* "his voice, articulation, and enunciation were so clear and distinct that no one, without an anatomical examination, would have suspected the deformity."

It is true that, in common with most original inventors, Dr. Stearns arrived at this result through methods and mechanism the most complicated and difficult of manufacture. It is this which has stood in the way of general adoption of his appliance; but it does not detract from his merit as an original inventor, or lessen the truth of the statement that, through his labors, he rendered possible the production of the simpler and even more effectual apparatus next to be noticed,—that of Dr. N. W. Kingsley, of New York.

Perhaps the most important principle in artificial vela for a congenital cleft enunciated by Dr. Stearns was that the portion of the appliance designed to fill the fissure must be flexibly valve-like, and completely under the control of the muscles surrounding it, in order to the proper and easy production of certain sounds. He produced these results through the character of the material used (vulcanized soft rubber), and the making it embrace the levator muscles, which rendered its perfect control certain.

Owing to a certain carelessness in the editorship of the periodicals of his day, there has been created an impression that Dr. Stearns was of England. This is possibly owing to the fact that he published his first account of his appliance in the *London Lancet*, while on a visit to that country. As has been shown, however, his invention belongs to this country only.

Dr. N. W. Kingsley began his experiments in palatal apparatuses about the year 1860. He worked in conjunction with Dr. Stearns in his first case, that gentleman being at the time in mercantile business in New York. Afterward Dr. Kingsley made many improvements in Stearns's appliance, which were designed principally to obviate complication and difficulties of manufacture. Dr. Kingsley exhibited the improved instrument before the American Dental Convention in 1863. In 1864, he finally devised his present artificial palate and velum, a production at once original with himself, and as eminently simple as others had been complicated.

In the absence of cuts, it is impossible to give a correct idea of this appliance; but it may be truly said that, up to this time, Dr. Kingsley's form of instrument, in both practical value and ease of manufacture, stands at the head of the list of similar appliances.

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* Dr. N. W. Kingsley.

DENTAL ASSOCIATIONS.

ORIGINAL AND REPRESENTATIVE BODIES.

Less than forty years ago there was not a dental society or association in this country. To-day they may be enumerated by scores.

These facts prove the increase of the profession in numbers beyond dispute. To what extent they indicate its growth in public importance and scientific attainments is a problem which may be solved by a cursory review of the existence and acts of the principal associations, historically considered, which have from time to time appeared in the dental world. Of *all* those now, or which have been, in existence in this country, it will be impossible in our circumscribed limits to treat fully. This sub-section, therefore, shall be confined to a consideration of two classes of associations: those which came first, and may be said to be the foundation on which our present system rests, and those of that system which are its result.

In the first class are included the American Society of Dental Surgeons, the Virginia Society of Dental Surgeons, the Mississippi Valley Association of Dental Surgeons, the Pennsylvania Association (now *Society*) of Dental Surgeons, and the (first) New York State Society of Dental Surgeons. To the second class belong the American Dental Convention and the American Dental Association.

In the primary stages of American dentistry the profession was peculiar, but not singular, in the fact of its strong conservatism. This state is common to all bodies numerically small and scientifically deficient (we are speaking of the average profession). Under such conditions it is almost invariably the case that processes and agencies are jealously guarded in secrecy, and the approaches of inquiry and investigation is viewed with a watchful and forbidding eye. Such knowledge as is possessed is regarded as the property and for the benefit of individuals alone [illegible]

But dentistry was a [illegible] profession, and possessed inherent sources of [illegible] which at length became apparent. For a long time the really scientific of the brotherhood might almost be numbered on the fingers; but this could not and did not continue. The standard of excellency, from the labors of such men as Hudson, Hayden, Parkhurst, Gardette, Randall, and others, became gradually higher, and the profession assumed a more important and responsible position.

In this latter fact, however, lay hid the seeds of danger, for increasing importance brought to dentistry a consequent accession of money value, and when, during the financial troubles of 1835–6, many in other occupations were thrown out of their customary employments, there seemed no door of refuge so widely opened to them as that into the practice of dentistry, a calling, they argued, which required little or no preparation for its successful pursuit, and in which the emoluments were sufficiently large and certain to insure pecuniary success. Accordingly dentistry became overrun with those who did not possess the smallest share of qualifications for that profession, and who could only very seriously injure it and its abler practitioners. "It is a notorious fact that the number of dentists in the United States was nearly doubled in the two years following 1836." *

Also, but few years before (1833–1835), it was shown through the Crawcours and Mallan on how precarious a position the dentistry of the time was fixed, and how unformed was the public mind in its regard. Without scientific ability, prestige, or reputation, these charlatans had quietly and with certainty usurped such a place in the public view of the profession as they were by no means in justice entitled to, and had, through the simple agency of a flourish of trumpets, so to speak, endangered the very existence of that profession in a scientific view.

As long before as 1817, Dr. Hayden had broached the idea of a national convention of dentists;† but the "pear was not ripe," for dentistry then appeared secure. From time to time he renewed his attempts only to fail again.

But when he made a final effort in 1838,‡ he was more successful. In the crusade against the Crawcours the profession had descried some of the advantages resulting from associated effort, and, again threatened, it seized the opportunity offered by Dr. Hayden's idea.

About the year 1837 was instituted in New York city an associ-

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* American Journal of Dental Science, 1st Series, vol. vii. p. 207.

† Ibid., vol. i. p. 246.

‡ Ibid.

[illegible] under the title of [illegible] New York Society of Dental [illegible]. This body had only a limited existence, and there are [illegible] of beginning or ending. It, [illegible] at least one [illegible] New York, of [illegible] resolutions [illegible] Journal of [illegible] that periodical. [illegible]

[illegible] regularly organized, [illegible] character. [illegible] than, to be [illegible] effect.

[illegible] at the American [illegible] in [illegible] adjourned to [illegible] and [illegible] the [illegible] officers. [illegible]

[illegible] SOCIETY OF DENTAL SURGEONS.[illegible]

[illegible] the [illegible] surgery [illegible] practitioners and [illegible] of a national [illegible]

[illegible] surgery [illegible] Surgeons [illegible] Society [illegible] and respect- [illegible] between [illegible]

[illegible]

Article II. Of the Name of the Society.

The Society shall be known and designated by the name and title of "The American Society of Dental Surgeons."

Article III. Of the Officers of the Society.

Sec. 1. The officers of the Society shall consist of a President and three Vice-Presidents, a Recording and a Corresponding Secretary, a Treasurer, a Librarian, an Executive, an Examining, and a Publishing Committee.

Sec. 2. The election of the above-named officers shall be by ballot at a regular annual meeting of the Society, a majority of votes determining the election.

Article IV. Of Members of the Society.

There shall be two classes of members, known and recognized as Acting Members or Fellows, and Honorary Members, the former consisting of those who subscribe this constitution, either personally or by proxy, and pay into the treasury the annual dues required by this constitution, and the latter embracing such members as are merely elected to membership.

Article V. Of the Requisitions of Membership.

Sec. 1. Each and every Acting Member of this Society shall either have been such by virtue of his attendance in person, by proxy, or by letter at the time of its formation, or as shall be afterwards elected, as prescribed by this constitution, and subscribe to the same.

Sec. 2. Each and every Acting Member shall pay into the treasury of the Society the annual sum of five dollars, for the benefit of its funds.

Sec. 3. Each and every Acting Member shall be required to attend the Society at least once in three years, unless excused by the Society.

Article VI. Of the Election of Members.

All members of the Society, excepting those who were Acting Members at the time of forming the same and establishing this constitution, shall be elected as follows, viz.: The candidate for membership shall be proposed at a regular meeting by the Executive Committee, whereupon two tellers shall be appointed by the presiding officer, who shall collect the ballots, consisting of slips of paper having plainly written on them either *yea* or *nay*. In case two-thirds of the members present shall vote in the affirmative the candidate shall be declared to have been duly elected a member of this Society.

Article VII. Of the Expulsion of Members.

Any member of this Society may be expelled for immoral conduct, malpractice in business, or other sufficient cause, on motion of one member, seconded by another at any regular meeting of the Society, in which case a majority of three-fourths of the members present shall be required.

Article VIII. Of the Meetings of the Society.

The meetings of the Society shall be held annually by adjournment, from time to time, and from place to place, agreeably to the will of the Society.

Article IX. Of the Resources of the Society.

Sec. 1. The Society may receive contributions of money, books, or other property, which may be either used or sold in aid of its purposes.

Sec. 2. Each and every candidate examined and admitted to membership, shall pay to the treasurer a fee of twenty-five dollars before receiving his diploma.

Sec. 3. Each and every person who shall become an active member of the Society by election, shall pay ten dollars for the benefit of its funds, which shall entitle him to a diploma.

Article X. Of the Disposition of the Funds of the Society.

The funds of the Society may be appropriated to the purchase of lands, tenements, chemical or philosophical apparatus, the publishing of books, tracts, and other papers and documents, and to such charitable objects as shall hereinafter be enumerated.

Article XI. Of the Distribution of the Effects of this Society in the event of its final dissolution.

Sec. 1. In case a dissolution of the Society shall at any time be proposed, a meeting shall be called specially for that purpose, and the consent of three-fourths of its members shall be required to effect it.

Sec. 2. Should the Society thus be dissolved by its own act, the property belonging to it shall be sold by order of the President, or by any three Fellows who shall obtain authority from a majority of the living and subscribing members, and the assets of sale shall be equally divided among the subscribing members.

Article XII. Of the Indispensable Qualifications of Candidates who have never yet entered upon professional practice.

Sec. 1. The candidate shall be at least twenty-one years of age; shall have a good English education; shall produce evidence of unexceptionable moral character; and shall have studied and practiced for the full term of two years with some practical dentist known as such to this Society.

Sec. 2. No candidate for membership who has the diploma of any dental college, regularly chartered in any of the United States, shall be subjected to re-examination by the Examining Committee of this Society, but shall be entitled to a diploma by complying with the By-Laws.

Article XIII. Of the Quorum required to transact business, and of the contingency of there being no quorum present at any meeting.

Sec. 1. Seven acting members, or Fellows, of the Society, besides the President or chairman, shall be necessary for the transaction of business at the opening of any annual meeting.

Sec. 2. In the event that a quorum cannot be obtained at any regular meeting of the Society, the time of meeting on the following year shall be the second Tuesday of August, at the place the same as on the preceding year.

Article XIV. Of the Charitable Objects of the Society.

Sec. 1. Any surplus moneys in the treasury may be appropriated, at any regular meeting of the Society, for the aid and relief of the widows and orphans of deceased members, or for the benefit of living members reduced to want, by sickness or other calamity, it being provided that no such appropriation shall be made without the consent of two-thirds of the members present.

Sec. 2. Other charitable or patriotic appropriations may be made at any regular meeting of the Society, by a majority of three-fourths of the members present.

Sec. 3. The President may at any time give pecuniary assistance to any member, or to the surviving family of any deceased member, out of any moneys in the treasury, deposited there by benevolent individuals.

Art. XII. *Of Alterations and Amendments of this Constitution.*

Any alteration, amendment, or revision of this constitution may be made at any regular meeting of the Society, by the joint assent of three-fourths of the Fellows present at such meeting.

The officers elected under the above constitution were: Horace H. Hayden, M.D., President; Josiah F. Flagg, M.D., Eleazer Parmly, M.D., and E. B. Gardette,* Vice-Presidents; Solyman Brown, A.M., Recording Secretary; Chapin A. Harris, M.D., Corresponding Secretary; Elisha Baker, Treasurer; J. H. Foster, M.D., [illegible] Parmly, Levi S. Parmly, Enoch Noyes, Lewis Roper, and Nathan C. Keep, [illegible]; J. Smith Dodge, [illegible] Harwood, David Harrington, Leonard Mackall, and P. H. Austen, [illegible]; Samuel W. Parmly, S. Spooner, John Lovejoy, Edward Hudson, and James S. Gunnell, [illegible]

[illegible] dental [illegible] progress, and [illegible] individual effort. [illegible] Horace H. Hayden [illegible] Solyman Brown, the first recording secretary, says [illegible] "When he shall have been [illegible] he will be remembered [illegible] of the American Society of Dental Surgeons."

[illegible] Society [illegible] resolved to estab-[illegible] Society [illegible] and [illegible] A. Harris.

[illegible] the idea was [illegible] necessity of [illegible] Society, one formal [illegible] of such [illegible] nature. [illegible] c. [illegible] laxity of its [illegible] to their per-[illegible] permanence and success of a

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[illegible] p. 288.

society, great care should be taken to admit into it only such members as could be relied upon to carry out its objects to the full; that "the more fixed and peremptory in its restrictions—the more exacting in its requisitions as to the attainments and qualifications of its members"—the greater would be its influence, and the higher could its aims and requirements be kept without danger to its existence. Of this freedom of entrance to the brotherhood, Dr. J. H. Foster said,* "This was the first great error, and the most fatal; it was the cause of all that strife, bickering, and contention which marked its career." Even Dr. Hayden, the prime mover and soul of the enterprise, is reported to have said,† "that the Society was founded upon principles which he did not approve, and that there had not been sufficient circumspection" in its organization.

The first meeting of the Society was taken up wholly by technical business. But at the next meeting, in 1841, it was free to attend to other matters; and here appeared the old enemy in the shape of "amalgam," introduced by the following question for discussion, propounded in a letter from Dr. J. H. Foster:‡ "Are there cases in which it is essentially advisable and important that teeth should be filled, in which gold foil cannot be used and other articles be substituted, so as to preserve the teeth a sufficient time to compensate for the operation?"

On this firebrand a committee was appointed to take action, and returned a report "That the use of lithodeon, mineral paste, and all other substances of which *mercury* is an ingredient, is injurious to the teeth, and that there is no tooth in which caries in it can be arrested and the organ rendered serviceable by being filled in which gold cannot be employed."§ This report was unanimously adopted.

But, as has been seen,‖ the enemy was so far from being destroyed by this that it even increased in vigor. Consequently, in 1843, a resolution was adopted declaring the use of amalgam to be malpractice; and again, in 1844, that the recording secretary give notice to each member charged by another with using "mineral paste," that such use had been declared by the Society to be malpractice, and that any thereafter persisting in its use would have their cases acted on by the Society.¶ Finally, at the meeting of 1845, the Society passed those resolutions, and drew up that document, which have since become part and parcel of history as the "amalgam protest and pledge."*

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* American Journal of Dental Science, 1st Series, vol. ix. p. 284.

† Ibid.

‡ Ibid., p. 285.

§ See "Plastic Fillings," and "Amalgam War."

‖ Ibid.

¶ American Journal of Dental Science, vol. vi. p. 174.

The consequence of these measures, since proved to have been much more vigorous than politic, was an immediate reduction in the membership of the Society, partly through expulsion, but principally from voluntary withdrawal, and a great decline in its influence; which, in fact, had never been so marked as it was primarily hoped it would become. The attention of the Society to its own internecine warfare had prevented the agitation of subjects of much more real moment to the profession. Says Foster,† "It was this vexed and agitated question (amalgam), and this only, that was discussed, so that the true objects of the Society were made null and void."

In 1850 it became so apparent that the Society had been pursuing a wrong course, that an effort was made to reinstate it in the good will of the general profession by rescinding the obnoxious "pledge" resolutions; but so much of the old leaven still clung to it, that the manner in which this was done served only to debase instead of elevate its position. To the intense disappointment of its friends and well-wishers, it refused the noble part of open and candid acknowledgment of faultiness, and substituted an evasive and equivocal course;‡ for it took the double (and doubly false) ground that the rescinded resolutions had accomplished their object, and that the Society was no longer to be considered responsible, to the community or the profession, in the matter. So ignoble was this course held, even by some of the members, that resignations of fellowship were its immediate consequence.

From this time forth, the Society was no longer even what it had been. Its authority and influence were lessened by its own act, and other societies and associations, in more popular repute and with equally high and more liberal pretensions, were springing up around it, and secured to themselves the most eligible members. At length, at the meeting of May 9th, 1855, a preliminary resolution was adopted directing the President (Dr. Townsend) to call a meeting to consider the question of the dissolution of the Society. This meeting convened in Philadelphia, August 1st, 1855, when the subject of dissolution was referred to a committee, which reported adversely, but which was continued, with power of further action, and the Society adjourned as usual, to meet in New York on the first Tuesday in August, 1856. On that day, after several vain attempts to secure the attendance of a quorum (which was finally obtained), the continued committee offered a report,—which was adopted*—"That we deem it expedient to dissolve this association, and that it be and is hereby adjourned *sine die*."

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* They are more fully reported in "Plastic Fillings," and "Amalgam War," which see.

† American Journal of Dental Science, 1st Series, vol. ix. p. 286.

‡ See report of the committee on rescinding the amalgam pledge, American Journal of Dental Science, 2d Series, vol. i. p. 66.

Thus ingloriously died the "American Society of Dental Surgeons." Organized sixteen years before, under the most flattering auspices and with a membership never since surpassed in this country in high professional ability and private reputation, it had, by a mistaken course of conduct obstinately persisted in, defeated its own objects and worked its own ruin. It had endeavored to constitute itself a professional arbiter and court of final adjudication. Such assumption has ever been exactly opposed to the spirit of our institutions and the instincts of a liberal and enlightened community. The consequences of such procedure could not but be evident, and were its legitimate result.

THE VIRGINIA SOCIETY OF SURGEON DENTISTS

was the next organization to the American Society of Dental Surgeons in point of time, being organized the 12th of December, 1842, at Richmond, Va. Its objects, as stated in resolution,† were, to benefit the science and the community, and "to distinguish and reward merit, and discountenance and expose quackery and charlatanism." Dr. J. D. McCabe, its secretary and the prime mover in the enterprise, continued this by saying,‡ "Too long has our favorite science been considered a mere mechanical trade, into which every unprepared quack, acquainted with the use of small tools, might obtrude himself at pleasure." This association was duly incorporated under the ordinary statutes of the State of Virginia regarding corporations.§ It was the first incorporated dental society in the world.

The principal recorded act of this association is in relation to the action of the American Society of Dental Surgeons on amalgam, and is embodied in a resolution having the power of a by-law, passed October, 1845, to the following effect: "*Resolved*, That we believe the use of all pastes and cements, of which mercury is a part, entirely unfit for, and highly objectionable, as fillings for carious teeth—that the use of them in dental practice is empirical, and is hereby declared to be malpractice. *Resolved*, That while we reprobate the use of all such mercurial preparations, and will execute our laws with fidelity and promptness, we claim no authority over the opinions of our members, nor will we ever require of them other pledges than those which exist among honorable men, united for the purpose of improving and elevating a noble science."*

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* Dental News Letter, vol. x. p. 87.

† American Journal of Dental Science, 1st Series, vol. iii. p. 146.

‡ Ibid., p. 227.

§ Ibid., vol. v. p. 247.

Extended comment on the above is unnecessary. Suffice it to say that the Virginia society by it avoided one of the reefs on which its sister society went down; but how far other dangers were evaded by it we cannot determine. It never attained to prominence in the profession, and there are no existing data which we have been able to obtain that determine the period of its dissolution.

THE MISSISSIPPI VALLEY ASSOCIATION OF DENTAL SURGEONS

was organized August 13th, 1844, and is the third in time of the dental societies of this country, and the oldest now in existence. It was the first association which abandoned the suppression of quackery as a cardinal point in its expressed objects, and the first to establish as its sole end and aim the elevation of the profession without distinction of persons; as appears by the following, the preamble to its constitution:† "The undersigned, practical dentists of the Mississippi Valley, deem it expedient to form an association, for purposes of mutual improvement in the science and practice of our profession. Desirous of promoting the exercise of that gentlemanly courtesy which should characterize members of liberal professions in both social and professional intercourse; believing also that by frequent interchange of opinions and observations in practice, by reporting, from time to time, cases of interest as they occur in individual practice, we may do much to elevate the character and standing of our profession, and make it worthy the confidence of an enlightened public."

The Society also passed a resolution against amalgam. In 1847 it began the publication of the *Dental Register of the West*, as a quarterly; which periodical is still its organ, although no longer in its possession.

The programme thus sketched has been ably and (barring the amalgam resolution) rigidly adhered to by this Society to the present time. For several years from the date of its organization it continued to be the leading dental association of the West, and was then and has ever been a power for good and progress in that part of the country.

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* American Journal of Dental Science, 1st Series, vol. vi. p. 160.

† Ibid., vol. v. p. 113.

The fourth regularly organized dental society in the United States was the

PENNSYLVANIA ASSOCIATION OF DENTAL SURGEONS,

organized in Philadelphia, December 15th, 1845. This was the first organization which did not, almost immediately upon its formation, express its reprobation of amalgam; in fact, its whole constitution and by-laws breathe a spirit of tolerance and primal regard for the science over any outside issues, which is in some contrast to its predecessors in existence,—excepting, perhaps, the Mississippi Valley.

This association has never obtruded its merits and position on the profession; but has, nevertheless, always kept in the front rank of scientific progress. It has probably done more real work, quietly and without ostentation, than any other dental society; for, from its organization until 1864 its meetings were quarterly, and since that time have been monthly, a record which no other similar organization in dentistry can exhibit.

On the 30th of October, 1847, a convention of some forty of the dentists of New York was held in that city, for the purpose of discussing the formation of a State Dental Society; and a call was issued to the dentists of the State to meet in New York, on the 17th of November following. On that date the convention re-assembled, and the result was the formation of the

SOCIETY OF DENTAL SURGEONS OF THE STATE OF NEW YORK.

This association was, in some measure, the child of the American Society of Dental Surgeons; for most of its members had formerly belonged (or did then) to that Society. The new body was intended as a sort of correction of the old. Its members, aware of the error of the parent body in neglecting those questions which were of practical moment to the profession, went to the other extreme in endeavoring to avoid it. They adopted every measure which appeared to be of any value in carrying out the idea of practicality; the most prominent of which was the establishment of an infirmary, with clinical practice by the members.

But, while they guarded so zealously some of the doors to success, others were unheeded; and the enemy at these crept silently in. The restrictions and qualifications as to membership were even less rigorous than with the American Society of Dental Surgeons; and the spirit of professional freedom and liberality was carried so far that an attempt was made to confer diplomas upon each of the members, without regard to their real qualifications or claims for such a distinction; this was defeated, however, but is useful as showing the *animus* of the association.

Where the fire burnt so fiercely, it could not but consume its fuel at a rapid rate; and as no more was forthcoming, it soon died away. For several meetings the Society was occupied in arranging and perfecting its many schemes for professional aggrandizement; but when the time came to put them in practice, they were found to perform but poorly, and the interest of the members in their work, at first so keen and vigorous, became gradually less, and finally ceased entirely. We have not been able to obtain any data respecting the decease of this association, but it is certain that it occurred not a very long time after its birth.

At the same time that the proposition for a dissolution of the American Society of Dental Surgeons was presented, a suggestion was advanced by the committee making the report (in consequence of remarks in the address of the President, Dr. E. Townsend), that an effort should be made to form another society, without any restrictions, so that every one in the country claiming to be a dentist could be received as a member.*

It is evident that the American Society had at length become awake to a knowledge of the fact that if they would be the *leaders* of dental progress, they could not also be its *drivers;* that force, in conducting public sentiment, was an element not always to be safely handled. But, in looking for the causes of their ill success in former years, they saw, plainest of all, and as very apparent and sufficient obstacles, certain enactments growing, as they imagined, out of a system of laws which they had established, in the shape of a constitution. Immediately attributing to this instrument the troubles previously undergone, they sought, by establishing an institution "without restrictions," to obviate any similar future difficulties. They also judged that an association which should aim to include the majority of dentists in its ranks, must interpose as few obstacles as possible to the entrance of members, and perform no after-acts which might excite feelings at variance with the existence of the body as such.

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* Dental Cosmos, vol. i. p. 198.

The result of these considerations was the formation of the

AMERICAN DENTAL CONVENTION,

at Philadelphia, August 2d, 3d, and 4th, 1855.* The title of the body, as first suggested, was the "American Dental *Congress*," which was, after some discussion, changed to that given above.† The plan of organization (contained in a series of "Articles of Association") comprehended the admission as members of "practitioners of dentistry and auxiliary branches of science,"—that a majority should elect such members, the voting for them to take place immediately upon nomination, and to be by ballot or *viva voce* as then determined,—and that the meetings be yearly, and the officers serve for a like term.‡

At this meeting upward of eighty dentists became members. The proceedings were interesting, and continued to be so, to a considerable number of practitioners, for several years, and the membership increased so that at the third session (Boston, 1857), over one hundred and ninety names were on the rolls.

Experience, however, had caused great fear of "red tape" in the conduct of societies. At the second session (New York, 1856) the membership articles of the constitution were suspended, and at the subsequent meeting the whole of that instrument was abrogated, and the Convention rendered an open one. So fearful were the members that an appearance of authority should be given to the proceedings of the association, that they would not permit the appointment of a committee, to which to refer a minor matter.§

At this meeting a resolution was passed ‖ providing for the establishment of "a fund for the promotion of dental science, with especial reference to the employment of some competent person or persons to conduct experiments,—physiological, pathological, chemical, and hygienic,—as connected with dental science."

This appears to have been the first "overt act" to cause any feeling against the efficiency and value of the Convention. It was said of this resolution,—and, it must be confessed, with reason,—"Have we become so low as to be mere mechanics, leaving the scientific part of our work to some man or other who does the thinking for us for dollars and cents? . . . . There is, then, no further need for study. . . . . Henceforth, when the day's operating is done, we may sit in our easy-chairs and read novels, knowing that "the man" will send us results when he gets at them."* This was, no doubt, a very severe rebuke to a body assuming any scientific importance or character; but it was certainly deserved.

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* Dental News Letter, vol. ix. p. 2.

† Ibid.

‡ Ibid.

§ Ibid., vol. xi. p. 4 *et seq.*

‖ Ibid, p. 58.

But this was not the only cause for complaint against the new institution. The character of its proceedings was very severely criticised as being much below the standard demanded by the times. These were eminently progressive in every branch of science, natural and other. Never in the history of our country had it shown so much vitality, such an exuberance of life-force, as then. In the eloquent language of Dr. McQuillen, "Never at any period was the iconoclastic spirit more rampant than now. The land is strewn with the wrecks of broken idols. Doctrines respectable from the very grayness of their antiquity are rudely hauled up to the bar of popular judgment, and as summarily dispatched. Social and political dogmas that have stood undisturbed for centuries, recognized of all men as true and real, vanish into thin air before the sharp scrutiny of modern inquiry."†

In allusion to the report of the proceedings of the third meeting it was said,—"Such an incongruous mixture of sense and nonsense was probably never heard before in any so-called scientific convention. . . . . Nothing was said to throw a new light upon any subject under discussion, and no papers were read. The conclusion which must be arrived at by any one who takes this body of men as a representation of the profession is, that we are a set of mere manipulators, but by no means scientific men."‡

In short, and in effect, the experiment of the Convention was voted, by the best class of dentists, to have been a failure. "Its day of usefulness is apparently passed; its absurdities censured with just cause; losing the support of its best men, its end seems near at hand."§

This prophecy, however, was not true; for the Convention still exists, and meets the requirements of, and is a great aid to, many in the profession.

In this state of affairs it became a necessity that another association should be attempted, and this matter was much agitated in all parts of the country. Various plans of organization were advocated; and, as was proper, the schemes of the two former national societies—the

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* American Journal of Dental Science, 2d Series, vol. viii. pp. 242-3.

† Dental News Letter, vol. xii. p. 184.

‡ American Journal of Dental Science, 2d Series, vol. viii. p. 241.

§ Dental News Letter, vol. xii. p. 185.

American Society of Dental Surgeons and the American Dental Convention—were thoroughly reviewed. In the latter the effects of absolute latitude in the admission of members were, at length, glaringly apparent, and it was, after many years, discovered that the true secret of failure of these associations lay, not in the fact that they had or had not systems of laws, or in those laws, as such, but in the basis of indiscriminate membership upon which they had been founded. It was finally seen that "the absence of a constitution, laws, or qualifications for membership, partakes of the transient, not the established."*

Defects are always plain to the sight; but it is not always so easy to remedy them. A happy solution to the difficulties of forming an association which should be at once stable and yielding,—easy of access, yet with exact and firmly held qualifications for membership; having a high scientific aim and character, yet into which the tyro could come and learn of his elders; possessing an organized and authoritative government, which should "derive its just powers from the consent of the governed;" and holding inherent from all these the elements of permanence, popularity, and authority,—was at length found in the system of *delegation* adopted by the

AMERICAN DENTAL ASSOCIATION.

This plan of organization was founded on that of the American Medical Association, and its initiation was effected mainly through the advocacy of Dr. J. H. McQuillen.†

It met with much opposition. At a meeting of dentists in New York City (June, 1859), among other resolutions on the subject was passed the following:

"*Resolved,* That it is the duty of every dentist who desires the advancement of the profession to attend the convention at Niagara Falls, and use his influence against any action tending to dissolve the American Convention, *or to create any delegated organization.*"‡

Against such an *animus* it would appear folly to have proceeded. Happily, the feelings thus represented did not pertain to that portion of the profession from which it was hoped to form the new association. A call for a meeting of delegates was promptly and cordially responded to, and twenty-five delegated members (from eight local societies and two dental colleges) met at Niagara Falls in August, 1859, and while the American Dental Convention was there also in session, they organized the American Dental *Association*, and drew up a form of constitution and by-laws which was adopted the next year in Washington.

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* Dental News Letter, vol. xii. p. 185.

† See article in Dental News Letter, vol. xii. p. 184, over the signature of "*Junius.*"

‡ The italics are ours.

In 1861 the Rebellion broke out, and there was no meeting of the Association. In 1862 it convened at Cleveland with only fourteen members. In 1863, in Philadelphia, fifty-six members were present. At Niagara, in 1864, there were eighty-eight, and in Chicago, in 1865, there were one hundred and twenty-four. At the meeting of 1870, beside the permanent membership, delegates from forty-seven societies and three colleges were present. The membership is larger now than ever before, but the attendance since 1865 will not, as an average, vary much from the number of that year.

The principal official act of this Society is the promulgation of a *code of dental ethics*, in Boston, 1866. This code, or its equivalent, was adopted by many of the societies in the country, and is still held by most of them; but it appears to have sufficiently served its original purpose; for in the formation of new societies at the present time it is being considerably modified. Such change, however, seems to have, thus far, consisted mainly in condensation; which is the best possible eulogy of the spirit of the old code.

"Thus, this Association, conceived at a period apparently the most inauspicious, and rocked in the cradle of adversity, has gained fair proportions, and exercised a powerful influence in the profession, by stimulating individual and associated effort. It will be folly to regard its organization as perfect."* It has met, however, and evidently still fills, the needs of the profession in this direction.

GENERAL STATISTICS.

Under this head will be presented a statistical review of the various dental associations formed in this country up to the present. Indulgence, however, is craved for lack of fullness in many cases. In the short space of time allowed for the preparation of this work, it has been found impossible to secure such complete information in this regard as could be wished. However, it has been deemed better to present even a partial account than to entirely ignore the matter;

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* Dental Cosmos, vol. vii. p. 79.

and such representations as are here made may be considered to be mainly correct.

The various associations are placed in the order of their formation, chronologically, without reference to any other consideration. Wherever possible, the original and present officers have been named, and such other matters of principal importance as are at hand. Where such information is not inserted, its absence may be concluded to have arisen from the reasons above stated.

American Society of Dental Surgeons.

Organized in New York City, as a national association, August 18th, 1840. First officers:—Horace H. Hayden, M.D., *President;* Josiah F. Flagg, M.D., *First Vice-President;* Eleazer Parmly, M.D., *Second Vice-President;* E. B. Gardette,* *Third Vice-President;* Solyman Brown, A.M., *Recording Secretary;* Chapin A. Harris, M.D., *Corresponding Secretary;* Elisha Baker, *Treasurer;* J. H. Foster, M.D., *Librarian.*

Dr. Hayden continued in the office of President until his death, in 1844, when Dr. Eleazer Parmly was elected to the position, and filled it until 1853, when he declined serving further, and Dr. Elisha Townsend was elected and remained in office until the dissolution of the Society, which occurred August 7th, 1856.

The Virginia Society of Surgeon Dentists.

Organized in Richmond, Virginia, December 12th, 1842. First officers:—S. Lethbridge, *President;* John G. Wayt, *Vice-President;* James D. McCabe, *Corresponding and Recording Secretary;* S. M. Sheppard, *Treasurer;* W. W. H. Thackston, R. N. Hudson, John McConnell, T. B. Hamblin, William M. McKenney, *Executive, Examining, and Publishing Committee.*

An incorporated body. It is not believed to have had a long existence; though the period of its dissolution is not known.

The Mississippi Valley Association of Dental Surgeons.

Organized in Cincinnati, Ohio, August 13th, 1844. First officers:—Jesse W. Cook, *President*; A. D. Bigelow, *First Vice-President*; Joseph Taylor, *Second Vice-President*; D. P. Hunt, *Third Vice-President*; W. B. Ross, *Recording Secretary*; James Taylor, *Corresponding Secretary*; Charles Bonsall, *Treasurer*; M. Rogers, John Allen, F. E. Suire, *Executive Committee*.

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* Dr. Gardette, having been elected without his knowledge, afterward refused to be so connected with the Society. His place does not appear to have been filled.

The oldest dental association now in existence.

The Pennsylvania Association of Dental Surgeons.

Organized in Philadelphia, December 15th, 1845. First officers:—G. A. Plantou, *President*; Ely Parry, *First Vice-President*; Stephen T. Beale, *Second Vice-President*; C. C. Williams, *Recording Secretary*; R. Arthur, *Corresponding Secretary*; F. Reinstein, *Treasurer*.

Present officers:—Spencer Roberts, *President*; J. H. Githens, *Vice-President*; Joseph Pettit, *Secretary*; E. H. Neall, *Treasurer*; W. H. Trueman, *Librarian*.

The Society of Dental Surgeons of the State of New York.

Organized in New York City, November 17th, 1847. First officers:—L. Covell, *President*; J. G. Ambler, *Secretary*; Geo. E. Hawes, *Treasurer*. These were elected pro tem., but held their positions until the yearly meeting of the following year. This Society did not exist very long.

Society of the Alumni of the Baltimore College of Dental Surgery.

Organized in Baltimore, March 1st, 1849. First officers:—H. [illegible], *President*; P. H. Austen, *Vice-President*; C. O. Cone, *Treasurer*; R. W. Armstrong, *Corresponding Secretary*; M. J. Cherry, *Recording Secretary*.

No longer in existence.

The New Hampshire Dental Society.

Organized in Concord, June 1st, [illegible]. First officers:—M. T. Willard, M.D., *President*; Abraham Robertson, M.D., D.D.S., *Vice-President*; L. F. Locke, M.D., *Secretary*; J. W. Little, M.D., *Treasurer*; A. Severance, *Auditor*.

This association is not now in existence.

Vermont Society of Dental Surgeons.

Organized in Montpelier, October 25th, 1854. First officers:—O. R. Post, *President;* M. Newton, *First Vice-President;* Josephus Brockway, *Second Vice-President;* E. V. N. Harwood, *Recording Secretary;* N. G. Hale, *Corresponding Secretary;* E. H. Kilbourne, *Treasurer;* G. H. Kilbourne, *Librarian.*

This society is not in existence.

American Dental Convention.

Organized in Philadelphia, August 2d, 3d, 4th, 1855. First officers:—J. B. Rich, *President;* J. S. Clarke, *Vice-President;* J. H. McQuillen, *Corresponding Secretary;* Charles Bonsall, *Recording Secretary.*

Subsequent Presidents in their order, to date: 1856, Chapin A. Harris, M.D.; 1857, James Taylor; 1858, Isaiah Forbes; 1859, L. W. Rogers; 1860, T. L. Buckingham, D.D.S.; 1861, John Allen, D.D.S.; 1862, A. Westcott, M.D.; 1863, J. Taft, D.D.S.; 1864, W. W. Allport; 1865, H. E. Peebles; 1866, W. B. Hurd; 1867, J. G. Ambler; 1868, J. M. Crowell; 1869, J. G. Ambler; 1870, J. G. Ambler; 1871, Wm. Dutch; 1872, I. J. Wetherbee; 1873, John Allen, D.D.S.; 1874, B. F. Coy; 1875, B. F. Coy.

The remaining officers elected in 1875 are, C. S. Stockton, *Vice-President;* Ambler Tees, *Recording Secretary;* S. Welchens, *Corresponding Secretary;* J. G. Ambler, *Treasurer.*

Western Dental Society.

Organized in St. Louis, April 3d, 1856. First officers:—Edward Hale, Sr., *President;* H. E. Peebles, *First Vice-President;* W. W. Allport, *Second Vice-President;* Henry Barron, *Recording Secretary;* C. W. Spalding, *Corresponding Secretary;* A. Black, *Treasurer.*

North Carolina Dental Society.

Organized in Raleigh, October 17th, 1856. First officers:—W. F. Bason, *President;* T. W. Howlett, *Vice-President;* W. C. Benbow, *Secretary;* R. P. Bessent, *Treasurer.*

Believed to be not now in existence.

St. Louis Dental Society.

Organized in St. Louis, December 11th, 1856. First officers:—S. Dunham, *President*; A. Blake, *Vice-President*; A. M. Leslie, *Secretary*; G. H. Perine, *Treasurer*.

Pennsylvania Central Society of Dental Surgeons.

Organized in Tyrone City, Pennsylvania, May 4th, 1857. First officers:—D. D. Hutchinson, *President*; J. W. Crawford, *Vice-President*; S. Kimmell, *Secretary*; W. D. Bimer, *Treasurer*.

New York Dental Society.

Organized in New York City, December 3d, 1857. First officers:—J. G. Ambler, *Secretary*; W. B. Roberts, *Treasurer*. The *Chairman* to be appointed at each meeting.

This association was not of long duration.

Indiana State Dental Convention.

Organized in Indianapolis, December 28th, 1858. First officers:—J. F. Johnston, *President*; J. P. Ulrey, P. G. C. Hunt, A. M. Moore, *Vice-Presidents*; G. C. North, *Secretary*.

Georgia Dental Society.

Organized in Macon, Ga., July 1st, 1859. First officers:—D. S. Chase, *President*; F. Y. Clark, *First Vice-President*; G. W. Emerson, *Second Vice-President*; W. F. Lee, *Recording Secretary*; E. Parsons, *Corresponding Secretary*; J. Fogle, *Treasurer*.

American Dental Association.

Organized in Niagara Falls, August 3d, 1859, and in Washington, D. C., July 31st, 1860. First officers elected in 1860:—Wm. H. Atkinson, M.D., D.D.S., *President*; J. B. Gibbs, *First Vice-President*; F. Y. Clark, M.D., *Second Vice-President*; J. Taft, D.D.S., *Recording Secretary*; W. Muir Rogers, *Corresponding Secretary*. The Chairman at the preliminary meeting in 1859 was W. W. Allport, M.D., and the Secretary J. Taft, D.D.S.

The successive places of meeting and Presidents since the above are as follows: No meeting in 1861; Cleveland, Ohio, 1862, Geo. Watt; Philadelphia, 1863, W. H. Allen; Niagara Falls, 1864, J. H. McQuillen, M.D.; Chicago, 1865, C. W. Spalding; Boston, 1866, C. P. Fitch; Cincinnati, 1867, A. Lawrence; Niagara Falls, 1868, Jonathan Taft, D.D.S.; Saratoga, 1869, Homer Judd; Nashville, 1870, W. H. Morgan; Greenbrier, White Sulphur Springs, W. Va., 1871, George H. Cushing; Niagara Falls, 1872, P. G. C. Hunt; Put-in-Bay, Ohio, 1873, T. L. Buckingham, D.D.S.; Detroit, Mich., 1874, M. S. Dean; Niagara Falls, 1875, A. L. Northrop, D.D.S.

The remaining officers elected at the last session are as follows: H. J. McKellops, D.D.S., *First Vice-President;* H. A. Smith, D.D.S., *Second Vice-President;* J. H. McQuillen, M.D., *Corresponding Secretary;* C. Stoddard Smith, D.D.S., *Recording Secretary;* W. H. Goddard, D.D.S., *Treasurer;* L. D. Shepard (Chairman), M. H. Webb (Secretary), Geo. L. Field, A. H. Brockway, G. R. Thomas, G. H. Cushing, G. C. Daboll, T. L. Buckingham, S. B. Palmer, *Executive Committee.*

New York State Dental Association.

Organized in New York City, September 6th, 1859. First officers:—A. Westcott, M.D., *President;* John Allen, *First Vice-President;* C. W. Harvey, *Second Vice-President;* G. H. Perine, *Recording Secretary;* A. Clark, *Corresponding Secretary;* W. H. Hurd, *Treasurer.*

This society is no longer in existence.

New York Society of Dental Surgeons.

Organized in and for New York City, March 13th, 1860. First officers:—A. McIlroy, *President;* F. H. Clark, *First Vice-President;* T. H. Burras, *Second Vice-President;* E. C. Rushmore, *Recording Secretary;* B. W. Franklin, *Corresponding Secretary;* James T. Stratton, *Treasurer;* John Allen, *Librarian.*

This association is not in existence.

Kentucky State Dental Association.

Organized in Lexington, April 24th, 1860. First officers:—W.

D. Stone, *President;* Richard Peckover, *Vice-President;* W. Muir Rogers, *Secretary;* J. A. McClelland, *Treasurer.*

Northern Ohio Dental Association.

Organized in Cleveland, March 6th, 1860. First officers:—B. Strickland, *President;* H. P. Huntington, *Vice-President;* C. R. Butler, *Recording Secretary;* B. F. Robinson, *Corresponding Secretary;* F. S. Slosson, *Treasurer.*

Brooklyn Dental Association.

Organized in Brooklyn, N. Y., June 12th, 1862. First officers:—Wm. C. Parks, *President;* A. C. Hawes, *Vice-President;* Jno. Allen, *Treasurer;* Wm. B. Hurd, *Secretary.*

Western New York Dental Society.

Organized in Rochester, October 1st, 1862. First officers:—C. W. Harvey, *President;* L. W. Bristol, *Secretary.*

This association dissolved May 5th, 1869, its membership being merged into district societies under the law.

Central New York Dental Association.

Organized in Syracuse, N. Y., March 23d, 1863. First officers:—D. S. Ball, *President;* D. W. Perkins, *Vice-President;* S. B. Palmer, *Recording Secretary;* A. T. Smith, *Corresponding Secretary;* E. M. Skinner, *Treasurer.*

This association was eventually merged in the district societies of its section instituted under the law of the State.

Odontographic Society of Pennsylvania.

Organized in Philadelphia, May 19th, 1863. First officers:—Jacob Gilliams, *President;* John McCalla, C. A. Kingsbury, *Vice-Presidents;* Louis M. Lusson, *Recording Secretary;* J. H. McQuillen, M.D., D.D.S., *Corresponding Secretary;* Thomas Wardle, M.D., *Treasurer;* Wm. P. Henry, *Librarian.*

Present officers:—F. M. Dixon, *President;* M. H. Webb, E. T.

Darby, *Vice-Presidents;* E. L. Hewitt, *Recording Secretary;* J. H. McQuillen, M.D., D.D.S., *Corresponding Secretary;* S. H. Guilford, *Treasurer;* J. L. Eisenbrey, *Librarian;* S. S. Nones, *Curator;* T. C. Stellwagen, C. A. Kingsbury, Robert Huey, *Executive Committee.*

Iowa State Dental Society.

Organized in Muscatine, Iowa, in July, 1863. Incorporated 1867. First officers:—H. S. Chase, *President;* J. Hardman, *Vice-President;* W. O. Kulp, *Corresponding Secretary;* A. J. McGarvey, *Recording Secretary and Treasurer.*

Present officers:—T. A. Hallett, *President;* M. L. Jackson, *Vice-President;* John Rix, *Corresponding Secretary;* E. E. Hughes, *Recording Secretary and Treasurer.*

Merrimac Valley Dental Association.

Organized in Lowell, Massachusetts, October 29th, 1863. First officers:—A. Lawrence, *President;* D. K. Boutelle, S. H. Elliott, E. G. Cummings, *Vice-Presidents;* G. A. Gerry, *Recording Secretary;* L. F. Locke, *Corresponding Secretary;* S. Lawrence, *Treasurer.*

Present officers:—A. M. Dudley, D.D.S., *President;* T. Fillebrown, D.M.D., L. F. Locke, M.D., *Vice-Presidents;* W. E. Riggs, D.D.S., *Recording Secretary;* J. H. Kidder, M.D., *Corresponding Secretary;* H. Hill, D.D.S., *Treasurer;* A. Lawrence, M.D., *Librarian.*

Annual meeting in November; semi-annual in May.

Connecticut Valley Dental Society.

Organized in Springfield, Massachusetts, November 10th, 1863. First officers:—F. Searle, *President;* O. R. Post, C. Stratton, *Vice-Presidents;* L. D. Shepard, *Secretary;* H. M. Miller, *Treasurer;* E. V. N. Harwood, C. S. Hurlbut, A. A. Howland, *Executive Committee.*

Meets semi-annually, in November and June.

Present officers:—H. F. Bishop, *President;* H. W. Clapp, E. M. Goodrich, *Vice-Presidents;* C. T. Stockwell, *Secretary;* N. Morgan, *Treasurer.*

Delaware Dental Association.

Organized in Wilmington, October 1st, 1863. First officers:—

S. Marshall, *President;* W. G. A. Bonwill, *Vice-President;* S. S. Nones, *Corresponding Secretary;* J. P. O'Daniel, *Recording Secretary;* C. R. Jefferis, *Treasurer;* W. D. Nolen, *Librarian.*

Hudson Valley Dental Association.

Organized in Troy, New York, December 29th, 1863. First officers:—H. H. Young, *President;* S. D. French, *Vice-President;* S. J. Andres, *Recording Secretary;* S. P. Welsh, *Corresponding Secretary;* O. R. Young, *Treasurer.*

Chicago Dental Society.

Organized in Chicago, February 8th, 1864. First officers:—E. W. Hadley, *President;* J. H. Young, L. Bush, *Vice-Presidents;* E. W. Sawyer, *Secretary;* J. C. Dean, *Treasurer;* W. W. Allport, *Librarian.*

Present officers:—C. R. E. Koch, *President;* A. W. Harlan, J. A. W. Davis, *Vice-Presidents;* D. B. Freeman, *Recording Secretary;* J. S. Swartley, *Corresponding Secretary;* M. S. Dean, *Treasurer;* C. R. E. Koch, *Librarian.*

Massachusetts Dental Society.

Organized in Boston, March 4th, 1864. First officers:—N. C. Keep, *President;* I. J. Wetherbee, *Vice-President;* T. H. Chandler, *Recording Secretary;* E. C. Rolfe, *Corresponding Secretary;* S. J. McDougall, *Treasurer;* E. N. Harris, *Librarian;* I. A. Salmon, A. A. Cook, B. S. Codman, H. F. Bishop, T. B. Hitchcock, *Executive Committee.*

Incorporated April 1st, 1865. Present officers:—J. T. Codman, *President;* D. G. Harrington, A. M. Dudley, *Vice-Presidents;* G. F. Grant, *Recording Secretary;* T. H. Chandler, *Corresponding Secretary;* E. Page, *Treasurer;* G. F. Grant, *Librarian;* R. R. Andrews, *Microscopist;* Thomas Cogswell, J. S. Hurlbut, E. P. Bradbury, A. M. Dudley, T. O. Loveland, *Executive Committee.* Meetings semiannually.

Wabash Valley Dental Association.

Organized in Lafayette, Indiana, April 20th, 1864. First officers:—A. M. Moore, *President;* W. H. Pifer, *Secretary.*

Buffalo Dental Association.

Organized in Buffalo, New York, May 27th, 1864. First officers:—Geo. E. Hayes, *President;* R. G. Snow, *Vice-President;* Geo. B. Snow, *Secretary;* J. R. Wetherill, *Treasurer.*

Connecticut State Dental Association.

Organized in Hartford, October 20th, 1864. First officers:—A. Hill, *President;* W. W. Sheffield, *Vice-President;* James McManus, *Recording Secretary;* Leroy D. Pelton, *Corresponding Secretary;* E. E. Crofoot, *Treasurer;* Chas. P. Graham, *Librarian.* Semi-annual meetings.

Susquehanna Dental Association.

Organized in Danville, Pennsylvania, early in 1864. First officers:—J. M. Barrett, *President;* G. B. Brown, *Vice-President;* John D. Wingate, *Recording Secretary;* M. D. L. Dodson, *Corresponding Secretary;* H. H. Martin, *Treasurer;* John Locke, *Librarian.*

Hartford Society of Dentists.

Organized in Hartford, Connecticut, June 12th, 1865. First officers:—John M. Riggs, *President;* E. E. Crofoot, *Vice-President;* C. M. Hooker, *Secretary;* Wm. Blatchley, *Treasurer.*

Illinois State Dental Society.

Organized in Chicago, July 24th, 1865. First officers:—A. C. Van Sant, *President;* E. Honsinger, *Vice-President;* Edgar Park, *Secretary;* S. Babcock, *Treasurer;* J. A. Truesdell, *Librarian.*

Central Ohio Dental Association.

Organized in Mansfield, Ohio, September 5th, 1865. First officers:—James Armstrong, *President;* M. De Camp, *Vice-President;* A. W. Maxwell, *Recording Secretary;* H. J. Cressinger, *Corresponding Secretary;* F. W. Semple, *Treasurer.*

St. Louis Odontological Society.

Organized in St. Louis, October 26th, 1865. First officers:—E. Hale, Jr., *President;* J. Payne, *Vice-President;* G. G. Samuel, *Corresponding Secretary;* G. H. Silvers, *Recording Secretary.*

Missouri Dental Association.

Organized in St. Louis, October 31st, 1865. First officers:—H. J. McKellops, *President;* G. S. Morse, M. McCoy, *Vice-Presidents;* H. Judd, *Recording Secretary;* J. Payne, *Corresponding Secretary;* A. M. Leslie, *Treasurer.*

Massachusetts Central Dental Association.

Organized in Worcester, Massachusetts, November 13th, 1865. First officers:—Seth P. Miller, *President;* A. A. Cook, W. N. Snow, *Vice-Presidents;* O. C. White, *Corresponding Secretary;* J. N. Tourtellotte, *Recording Secretary;* O. F. Harris, *Treasurer.*

Present officers:—H. F. Bishop, *President;* S. P. Martin, A. A. Howland, *Vice-Presidents;* Geo. F. Harwood, *Secretary;* J. F. Adams, *Treasurer;* C. W. Estabrook, John McGregory, S. W. Cook, *Executive Committee.*

Lebanon Valley Dental Association.

Organized in Reading, Pennsylvania, January 1st, 1866. First officers:—W. K. Brenizer, *Chairman;* S. H. Guilford, *Secretary.*

Newark Dental Association.

Organized in Newark, New Jersey, June 27th, 1866. First officers:—Wm. G. Lord, *President;* J. B. Da Camara, Jr., *Vice-President;* G. F. J. Colburn, *Secretary;* R. J. Reed, *Treasurer.*

Ohio State Dental Society.

Organized in Columbus, Ohio, in June, 1866. First officers:—Geo. Watt, *President;* G. W. Keely, B. F. Robinson, *Vice-Presidents;* A. W. Maxwell, *Corresponding Secretary;* H. A. Smith, *Recording Secretary.*

Present officers:—C. R. Taft, *President;* J. C. Whinery, A. F. Brown, *Vice-Presidents;* A. F. Emminger, *Corresponding Secretary;* H. L. Ambler, *Recording Secretary;* G. W. Keely, *Treasurer;* J. Taft (President), H. A. Smith, F. H. Rehwinkel, C. R. Butler, W. P. Horton (Secretary), *Board of Examiners.* This board issues certificates of qualification, under the State law, to practice dentistry.

Old Colony Dental Association.

Organized in Middleborough, Massachusetts, August 15th, 1866. First officers:—D. S. Dickerman, *President;* George R. Whitney, *Recording Secretary;* Loring W. Puffer, *Corresponding Secretary;* Julius Thompson, *Treasurer and Librarian.*

Present officers:—William E. Williams, *President;* Charles G. Davis, Julius Thompson, *Vice-Presidents;* Loring W. Puffer, *Secretary and Treasurer.*

North Carolina Dental Association.

Organized in Greensborough, North Carolina, September 5th, 1866. First officers:—B. F. Arrington, *President;* R. P. Bessent, J. W. Hunter, *Vice-Presidents;* R. D. Fleming, *Recording Secretary;* V. E. Turner, *Corresponding Secretary;* M. R. Banner, *Treasurer.*

Maine Dental Society.

Organized in Brunswick, Maine, September 18th, 1866. First officers:—E. Bacon, *President;* Wm. Randall, *Vice-President;* Thomas Fillebrown, *Recording Secretary;* A. K. Gilmore, *Corresponding Secretary.*

Present officers:—C. P. Sawyer, *President;* D. W. Merrill, *Vice-President;* G. W. Stoddard, *Secretary;* J. W. Curtis, *Treasurer;* Thomas Fillebrown, *Librarian.*

An incorporated society. Meetings semi-annual.

Hudson River Association of Dental Surgeons.

Organized in Poughkeepsie, New York, April 25th, 1867. First officers:—E. D. Fuller, *President;* W. A. Palmer, Geo. S. Allan, *Vice-Presidents;* L. S. Straw, *Recording Secretary;* T. W. Du Bois, *Corresponding Secretary;* T. C. Royce, *Treasurer.*

Poughkeepsie Dental Association.

Organized in Poughkeepsie, New York, June 17th, 1867. First officers:—James H. Mann, *President;* Chas. L. Houghton, *Vice-President;* H. F. Clark, *Secretary;* J. A. Jillson, *Treasurer.*

Harris Dental Association of Lancaster, Pennsylvania.

Organized in Lancaster, June 21st, 1867. First officers:—Jno. McCalla, *President;* J. W. Derr, *Vice-President;* W. N. Amer, *Secretary;* E. K. Young, *Treasurer.*

Tennessee Dental Association.

Organized in Nashville, July 26th, 1867. First officers:—W. H. Morgan, *President;* J. B. Wasson, J. C. Ross, *Vice-Presidents;* W. T. Arrington, *Recording Secretary;* R. Russel, *Corresponding Secretary;* Alex. Hartman, *Treasurer.*

Northern Iowa Dental Association.

Organized in Dyersville, Iowa, September 17th, 1867. First officers:—A. B. Mason, *President;* E. L. Clark, *Vice-President;* E. Noyes, *Corresponding Secretary;* D. H. Gill, *Recording Secretary;* C. Poor, *Treasurer.*

New York Odontological Society.

Incorporated 1867. First officers:—C. E. Francis, *President;* W. B. Hurd, *Vice-President;* Thos. Burgh, *Recording Secretary;* W. C. Horne, *Corresponding Secretary;* Geo. H. Perine, *Treasurer;* Wm. Carr, *Librarian;* A. L. Northrop, W. B. Hurd, Wm. C. Horne, *Executive Committee.*

Present officers:—A. L. Northrop, D.D.S., *President;* Benjamin Lord, W. A. Bronson, M.D., *Vice-Presidents;* Wm. Carr, M.D., *Corresponding Secretary;* Wm. Jarvie, Jr., *Recording Secretary;* Chas. Miller, *Treasurer;* W. E. Hoag, *Librarian;* C. E. Francis, Chas. D. Cook, *Executive Committee.* Meetings monthly.

American Academy of Dental Science.

Organized in Boston, Massachusetts, October 19th, 1867. First officers:—E. T. Wilson, M.D., *President;* D. M. Parker, M.D., *Vice-President;* E. N. Harris, D.D.S., *Secretary;* J. L. Williams, M.D., *Treasurer;* John Clough, M.D., *Librarian;* E. G. Tucker, M.D., D. M. Parker, M.D., J. L. Williams, M.D., *Censors.*

Present officers:—D. M. Parker, M.D., *President;* E. G. Tucker, M.D., *Vice-President;* W. L. Tucker, D.M.D., *Recording Secretary;* E. N. Harris, D.D.S., *Corresponding Secretary;* L. D. Shepard, D.D.S., *Treasurer;* John Clough, M.D., *Librarian;* J. L. Williams, M.D., W. W. Codman, M.D., Geo. T. Moffatt, M.D., *Censors.*

Regular meetings first Wednesday of each month. Annual meetings in Boston, last Monday in September.

West Jersey Dental Association.

Organized in Trenton, New Jersey, November 11th, 1867. First officers:—Geo. C. Brown, *President;* Lewis E. Reading, *Vice-President;* John B. Wood, *Secretary;* Thos. S. Stevens, *Treasurer.*

Charleston Dental Association.

Organized in Charleston, South Carolina, December, 1867. First officers:—I. B. Patrick, *President;* W. S. Brown, *Vice-President;* Theodore F. Chupein, *Secretary and Treasurer.*

Lehigh and Delaware Valley Dental Association.

Organized in Allentown, Pennsylvania, in 1867. First officers:—J. P. Barnes, *President;* E. R. Crane, W. E. Buckman, *Vice-Presidents;* J. D. Miller, *Recording Secretary;* W. C. Detweiler, *Corresponding Secretary;* M. E. Martin, *Treasurer.*

Brooklyn Dental Society.

Organized in Brooklyn, New York, December 14th, 1867. First officers:—H. G. Mirick, *President;* C. D. Cook, *Vice-President;* E. L. Childs, *Recording Secretary;* William Jarvie, Jr., *Corresponding Secretary;* I. C. Monroe, *Treasurer.*

[illegible] E. Brock-

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[illegible] Tuesday [illegible]

[illegible]

[illegible] J. [illegible] Miller. [illegible]

[illegible]

[illegible] W. S. [illegible]

[illegible]

[illegible] W. F. [illegible] Wheeler. [illegible]

Fourth District.

Present officers:—E. Doolittle, Schuylerville, *President;* C. H. Tilton, *Vice-President;* C. E. Stacks, *Secretary;* C. F. Rich, *Treasurer.*

Fifth District.

Present officers:—F. D. Nellis, Syracuse, *President;* H. W. Tompkins, Clayville,, *Vice-President;* John S. Marshall, Syracuse, *Secretary;* George Elliott, Syracuse, *Treasurer.*

Sixth District.

Present officers:—F. B. Darby, Elmira, *President;* F. S. Howe, *Vice-President;* G. L. Holden, *Secretary;* S. H. McCall, *Treasurer.*

Seventh District.

Present officers:—Frank French, Rochester, *President;* J. Requa, *Vice-President;* J. E. Line, *Secretary;* F. E. Howard, *Treasurer.*

Eighth District.

Present officers:—C. W. Stainton, Buffalo, *President;* G. B. Snow, *Vice-President;* G. C. Daboll, *Secretary;* W. A. Barrows, *Treasurer.*

Cumberland Valley Dental Society.

Organized in Carlisle, Pennsylvania, October 16th, 1868. First officers:—J. L. Suesserott, *President;* J. W. Bender, *Vice-President;* Geo. W. Neidich, *Secretary;* J. C. Miller, *Treasurer.*

East Tennessee Dental Association.

Organized in Knoxville, Tennessee, October, 1868. First officers:—J. Fouche, *President;* W. H. Cooke, *Recording Secretary and Treasurer;* S. H. Smith, *Corresponding Secretary.*

Present officers:—S. M. Protho, *President;* J. D. Morgan, *Vice-President;* S. B. Cooke, *Recording Secretary and Treasurer;* W. H. Cooke, *Corresponding Secretary.*

Pennsylvania State Dental Society.

Organized in Philadelphia, December 2d, 1868. First officers:—A. B. Robbins, *President;* J. L. Suesserott, Samuel Welchens, *Vice-Presidents;* Geo. W. Neidich, *Recording Secretary;* Thos. C. Stellwagen, *Corresponding Secretary;* Jno. McCalla, *Treasurer;* J. H. McQuillen, James Truman, H. Gerhart, J. G. Templeton, J. W. Moffitt, *Censors.*

Present officers:—E. T. Darby, *President;* J. C. Green, C. S. Beck, *Vice-Presidents;* R. H. Moffitt, *Recording Secretary;* S. H. Guilford, *Assistant Secretary;* M. H. Webb, *Corresponding Secretary;* S. Welchens, *Treasurer;* T. C. Stellwagen, G. W. Klump, C. N. Peirce, M. H. Webb, J. G. Templeton, J. C. Green, *Censors.*

Bucks County Dental Association.

Organized in Doylestown, Pennsylvania, June 7th, 1869. First officers:—H. P. Yerkes, *President;* G. W. Adams, *Secretary;* J. W. Scarborough, *Treasurer;* J. S. Rhoads, F. Swartzlander, J. Hayhurst, *Executive Committee.*

Texas State Dental Association.

Organized in Houston, Texas, June 16th, 1869. First officers:—M. M. Michau, *President;* L. E. Edmonson, *Vice-President;* P. T. Clark, *Corresponding Secretary;* T. Robinson, *Recording Secretary;* H. G. McNeil, *Treasurer;* J. D. Collier, *Librarian.*

Southern States Dental Association.

Organized in Atlanta, Georgia, July 28th, 1869. First officers:—W. T. Arrington, *President;* W. Reynolds, L. Augspath, J. G. McAuley, *Vice-Presidents;* F. J. S. Gorgas, *Corresponding Secretary;* J. G. Angell, *Recording Secretary;* W. G. Redman, *Treasurer;* W. H. Morgan, J. S. Knapp, J. R. Walker, W. S. Chandler, Albert Hape, *Executive Committee.*

San Francisco Dental Association.

Organized in San Francisco, California, September 1st, 1869.

First officers:—C. C. Knowles, *President;* H. E. Knox, *Vice-President;* W. J. Younger, *Corresponding Secretary;* J. Ball, *Recording Secretary;* F. A. Park, *Treasurer.*

Alabama State Dental Society.

Organized in Montgomery, October 6th, 1869. First officers:—J. G. McAuley, *President;* S. Rambo, —— Evans, *Vice-Presidents;* —— Reese, *Secretary.*

Georgia State Dental Society.

Organized about 1869. Present officers:—Geo. W. McElhany, *President;* M. S. Jobson, John H. Coyle, *Vice-Presidents;* Charles C. Allen, *Corresponding Secretary;* D. Smith, *Recording Secretary.*

South Carolina State Dental Association.

Organized about 1870. Present officers:—J. W. Norwood, *President;* J. R. Thompson, D. L. Boozer, *Vice-Presidents;* H. D. Wilson, *Corresponding Secretary;* G. F. S. Wright, *Recording Secretary;* T. W. Bouchier, *Treasurer.*

California State Dental Society.

Organized in San Francisco, June 29th, 1870. First officers:—C. C. Knowles, *President;* J. J. Menefee, S. W. Dennis, H. H. Pierson, *Vice-Presidents;* Wm. J. Younger, *Corresponding Secretary;* H. J. Plomteaux, *Recording Secretary;* J. N. Myers, *Assistant Recording Secretary;* F. A. Park, *Treasurer;* J. Ball, *Librarian.*

Wisconsin State Dental Society.

Organized in Milwaukee, September 28th, 1870. Incorporated, March 24th, 1871. First officers:—D. W. Perkins, *President;* E. N. Clark, Arthur Holbrook, *Vice-Presidents;* C. C. Chittenden, *Recording Secretary;* Edgar Palmer, *Corresponding Secretary;* J. C. Lukes, *Treasurer.*

Present officers:—C. W. Barnes, *President;* H. Enos, *Vice-President;* M. T. Moore, *Secretary;* J. C. Lukes, *Treasurer.*

New Jersey State Dental Society.

Organized in Trenton, October 25th, 1870. First officers:—J. Hayhurst, *President;* C. S. Stockton, *Vice-President;* E. F. Hanks, *Secretary;* L. E. Reading, *Treasurer.*

Present officers:—C. S. Stockton, *President;* J. W. Scarborough, *Vice-President;* Charles A. Meeker, *Secretary;* William H. Dibble, *Treasurer.*

Kansas State Dental Society.

Organized May 2d, 1871. First officers:—J. B. Wheeler, *President;* W. H. Marvin, *Vice-President;* J. D. Patterson, *Recording Secretary;* E. C. Fuller, *Corresponding Secretary;* J. H. Sawyer, *Treasurer.*

Dental Alumni Association of Harvard University.

Organized in Boston, Massachusetts, January 25th, 1872. First officers:—E. Page, D.M.D., *President;* J. T. Codman, D.M.D., *Vice-President;* C. Wilson, D.M.D., *Secretary;* T. O. Loveland, D.M.D., *Treasurer.*

Present officers:—Chas. A. Brackett, D.M.D., *President;* Charles Wilson, D.M.D., *Vice-President;* T. O. Loveland, D.M.D., *Secretary;* Edward Page, D.M.D., *Treasurer.*

Oregon State Dental Society.

Organized in Portland, March [illegible], 1873. First officers:—J. H. Hatch, *President;* L. S. Skiff, *Vice-President;* Wm. F. Thompson, *Corresponding Secretary;* J. R. Cardwell, *Recording Secretary;* J. Welch, *Treasurer.*

Texas State Dental Association.

Organized in Austin, September 17th, 1873. First officers:—W. G. Kingsbury, *President;* Wm. Stiles, L. Quinby, *Vice-Presidents;* A. A. Reville, *Recording Secretary;* R. E. Grant, *Treasurer;* C. E. Wise, *Corresponding Secretary.*

Pittsburgh Dental Association.

Organized in Pittsburgh, Pa., November 10th, 1874. First officers:—M. E. Gillespie, *President;* James S. King, *Vice-President;* H. W. Arthur, *Secretary;* J. G. Templeton, *Treasurer;* J. G. Templeton, W. F. Fundenberg, Gale French, *Censors;* Calvin King, J. G. Templeton, H. W. Arthur, *Executive Committee.*

Mississippi State Dental Association.

Organized in Vicksburg, April 21st, 1875. Officers:—J. D. Miles, *President;* A. H. Hilzheim, O. B. Hilzheim, *Vice-Presidents;* A. Riser, *Secretary;* J. B. Askew, *Treasurer;* J. D. Miles, J. B. Askew, A. H. Hilzheim, *Executive Committee.*

North Carolina State Dental Association.

Organized in Beaufort, August 11th, 1875. Officers:—B .F. Arrington, *President;* V. E. Turner, J. W. Hunter, *Vice-Presidents;* E. L. Hunter, *Secretary;* S. S. Everitt, *Treasurer.*

Alumni Association of the Baltimore College of Dental Surgery.

Organized in Baltimore, March 6th, 1876. Officers:—S. J. Cockerille, *President;* T. A. La Far, S. D. French, *Vice-Presidents;* T. H. Davy, *Recording Secretary;* Wm. B. Wise, *Corresponding Secretary;* Wm. H. Hoopes, *Treasurer;* F. J. S. Gorgas, Jas. H. Harris, W. H. Hoopes, *Executive Committee.*

Minnesota State Dental Association.

Present officers:—F. A. Williamson, *President;* P. S. Calkins, *Vice-President;* W. F. Lewis, *Secretary;* J. H. Bryant, *Treasurer.*

Central Pennsylvania Dental Association.

Organized about 1874. Present officers:—E. J. Greene, *President;* J. C. M. Hamilton, *Vice-President;* W. B. Miller, *Recording Secretary;* H. W. Buchanan, *Corresponding Secretary;* J. W. Isenberg, *Treasurer.*

Dental Society of the State of Maryland and District of Columbia.

Present officers:—R. B. Winder, *President;* Geo. S. Fouke, *Vice-President;* E. P. Keech, *Corresponding Secretary;* R. Finley Hunt, *Recording Secretary;* J. Curtiss Smith, *Reporting Secretary;* B. F. Coy, *Treasurer.*

Alumni Association of the Maryland Dental College.

Present officers:—Fred. A. Levy, *President;* John J. Williams, *Vice-President;* Chas. E. Busey, *Corresponding Secretary;* Richard M. Johnson, *Recording Secretary;* Cyrus M. Gingrich, *Treasurer.*

In the foregoing list will be seen a marked feature,—the recurrence of the same society name in several places: witness the various New York State societies. These are not repetitions of the same organizations. Succeeding similar appellations may be inferred to be consequent on the dissolution of previous associations of the same name.

DENTAL SCHOOLS AND COLLEGES.

THE origination of institutions for the teaching of dentistry was due to the persistent and determined efforts of a very few men of markedly liberal views in that profession. The great necessity for some radical change in the method of imparting dental instruction was sufficiently evident to any observing and impartial mind long before 1840. The practice of taking private students was then everywhere in vogue, and little could be said in its disfavor so long as the studentship was properly conducted, and the teacher imparted to his disciple that which he himself knew on the subjects proposed to be taught; and danger in this direction could not be apprehended when certain men of established position and integrity were the teachers. But such, unfortunately, was not always the case. The best men charged extremely high prices for a studentship. Dr. Eleazer Parmly offered, when in England, to receive students, and to render them fit for practice in London for one thousand, in other large cities for seven hundred and fifty, and in the provinces for five hundred dollars. The latter sum was "commonly asked for the office-fee of a student."* Such a charge was, of itself, amply sufficient to debar the great majority of seekers after dental learning from obtaining it at the hands of such as were capable of teaching them correctly; and they, consequently, were either forced to enter the profession without knowledge of the science, or to receive what they did learn from much inferior practitioners whose charges were not so great. As an instance of the latter class, there may be mentioned the case of a dentist (!) who offered fully to instruct students in dental practice in four weeks at a charge of thirty dollars.†

Such a state of affairs was naturally viewed with regret by such as were above the professional jealousies and secrecy in methods which then almost universally prevailed. These strove to induce a change in that state; and the quickest and most surely effectual of any method to produce the desired result appeared, and proved, to be the establishment of a school for dental instruction. From the above (and other) causes came the

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* American Journal of Dental Science, 2d Series, vol. ii. p. 98.

† Dental News Letter, vol. iv. p. 21.

Baltimore College of Dental Surgery,

the first institution of its kind in the world. It received its charter in 1839, and commenced its first session in the following year. The first officers and Faculty were as follows:

Horace H. Hayden, M.D., *President, Principles of Dental Science.*

Chapin A. Harris, M.D., *Dean, Theory and Practice of Dental Surgery, Theory and Practice of Dental Mechanism.*

Thomas E. Bond, M.D., *Dental Pathology and Therapeutics.*

H. Willis Baxley, M.D., *Anatomy and Physiology.*

The graduates of the class of 1841 were only two, Robert Arthur and R. Covington Mackall, of Maryland. These gentlemen were, therefore, the first in the world to receive the degree of "D.D.S."

During succeeding years the chairs were numerically increased.

In 1841 was added that of *Practical Anatomy*, Washington R. Handy, M.D., being the first professor. In 1844 came that of *Operative Dentistry*, with Joseph B. Savier, D.D.S., as its first incumbent. In 1846 was instituted that of *Mechanical Dentistry*, taught by Cyrenius O. Cone, M.D., D.D.S. In 1849 the chair of *Chemistry* was first filled by Philip H. Austen, M.D., D.D.S., and in 1856 came the professorship of *Microscopical and Comparative Anatomy*, filled at first by Christopher Johnston, M.D.

The present Faculty is as follows:

Ferdinand J. S. Gorgas, M.D., D.D.S., *Dental Surgery and Therapeutics, and Dean.*

Henry Reginald Noel, M.D., *Physiology and Pathology.*

E. Lloyd Howard, M.D., *Chemistry.*

James H. Harris, M.D., D.D.S., *Clinical Dentistry.*

James B. Hodgkin, D.D.S., *Dental Mechanism and Metallurgy.*

Thomas S. Latimer, M.D., *Anatomy.*

Judson B. Wood, D.D.S., *Demonstrator of Operative Dentistry.*

B. M. Wilkerson, M.D., D.D.S., *Demonstrator of Mechanical Dentistry.*

John C. Uhler, D.D.S., Edwin F. Wayman, D.D.S., and Frank S. Lewis, D.D.S., *Assistant Demonstrators.*

"Each candidate for graduation . . . . must prepare a written thesis describing operations upon the teeth, ... show specimens of operations upon the natural organs, and present an approved specimen of dental mechanism; also, he must have attended two full courses of lectures in this college. The following, however, will be accepted as equivalent to one course in this college:—One course in any reputable dental college; attendance and graduation in a reputable medical college prior to matriculation at this college, and one year's dental pupilage; five years' dental practice, including regular pupilage; an acceptable examination on entering college, before the full Faculty in session, on anatomy, physiology, inorganic chemistry, and practical dentistry, including a regular course of pupilage and several years' practice."*

The total number of regular graduates to date, is 613, of which were graduated in 1841, 2; 1842, 3; 1843, 6; 1844, 6; 1845, 5; 1846, 11; 1847, 10; 1848, 15; 1849, 16; 1850, 11; 1851, 18; 1852, 14; 1853, 22; 1854, 18; 1855, 27; 1856, 18; 1857, 20; 1858, 19; 1859, 20; 1860, 39; 1861, 29; 1862, 10; 1863, 9; 1864, 10; 1865, 11; 1866, 10; 1867, 31; 1868, 26; 1869, 26; 1870, 24; 1871, 27; 1872, 18; 1873, 27; 1874, 19; 1875, 17; 1876, 19. The college has also awarded one hundred and fifty-one honorary degrees (D.D.S.) from 1841 to 1871, since which last date it has granted none such. Total degrees conferred to date, 764.

It will be readily believed that the establishment of this school was violently opposed in many quarters, and it was confidently predicted that it would be short-lived. However, it lived down opposition, and still stands among the foremost of similar institutions. The museum in connection with it is worthy of note as very valuable and important.

The Ohio Dental College

was chartered in 1845, and commenced its first session in November of the same year in Cincinnati, where it has since been located. The first Faculty was composed of the following-named gentlemen:

Jesse W. Cook, M.D., D.D.S., *Dental Anatomy and Physiology, and Dean.*

Melancthon Rogers, M.D., D.D.S., *Dental Pathology and Therapeutics.*

James Taylor, D.D.S., *Practical Dentistry and Pharmacy.*

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* College "Triennial Catalogue."

Jesse P. Judkins, M.D., *Demonstrator of Anatomy.*

In 1846 a chair of *Chemistry* was added to the above, and was filled by Elijah Slack, M.D. In 1847, Wm. M. Hunter was appointed *Demonstrator of Mechanical Dentistry.* In 1848, Charles H. Raymond, M.D., was made *Lecturer on Chemistry.* In 1850 the chair of *Mechanical Dentistry* was created, and A. M. Leslie, D.D.S., appointed to it. This chair was changed, in 1851, to that of *Operative and Mechanical Dentistry,* with John Allen, D.D.S., as its incumbent. The chair of Practical Dentistry and Pharmacy was also then changed to that of *Principles and Practice of Dental Surgery,* and occupied by James Taylor, D.D.S. In 1853 the chair of Operative and Mechanical Dentistry was divided into two,—*Operative Dentistry,* filled by John Allen, D.D.S., and *Mechanical Dentistry,* to which H. R. Smith, D.D.S., was appointed. In 1855 the chair of Principles and Practice of Dental Surgery was changed to that of *Institutes of Dental Science,* and its duties assigned to James Taylor, D.D.S. A chair of *Chemistry and Metallurgy* was now created, and Geo. Watt, M.D., appointed to it.

In 1850 the Faculty passed a resolution that a committee of five for the examination, in connection with the Faculty, of candidates for graduation, should be selected annually, two from the medical and three from the dental profession. This was in force until 1860, when it was rescinded. During the winter of 1861–62, no session was held. The present Faculty is constituted as follows:

James Taylor, M.D., D.D.S., *Emeritus Institutes of Dental Science.*

Wm. Clendenin, M.D., *Anatomy.*

J. L. Cilley, M.D., *Physiology and Histology, and Practical Anatomy.*

F. Brunning, M.D., *Pathology and Therapeutics.*

J. Taft, D.D.S., *Operative Dentistry, Hygiene, and Microscopy, and Dean.*

J. S. Cassidy, D.D.S., *Chemistry.*

J. I. Taylor, D.D.S., H. M. Reid, D.D.S., *Clinical Dentistry.*

W. Van Antwerp, D.D.S., *Mechanical Dentistry.*

"A candidate for graduation must have had two full years of pupilage, part of which, at least, should be with a reputable dental practitioner, inclusive of two complete courses of lectures in a dental college. A graduate of a respectable medical college, who has had one year's pupilage under a reputable dentist, or a student having had a regular pupilage, and passed a satisfactory examination upon anatomy, elementary chemistry, and mechanical dentistry, may be admitted to an examination for the degree of D.D.S. after attending one full course of lectures. . . . He will be required to present and defend before the Faculty a written thesis upon some subject pertaining to dental science. He must also deposit in the college cabinet an artificial denture of his own workmanship made in the college."*

The total number of regular graduates of this college, to date, is 262, apportioned as follows: Class of 1846, 4; 1847, 5; 1848, 7; 1849, 8; 1850, 6; 1851, 4; 1852, 12; 1853, 14; 1854, 10; 1855, 12; 1856, 10; 1857, 5; 1858, 5; 1859, 12; 1860, 4; 1861, 5; 1863, 3; 1864, 5; 1865, 6; 1866, 18; 1867, 13; 1868, 9; 1869, 9; 1870, 10; 1871, 9; 1872, 12 (one female); 1873, 16; 1874, 7; 1875, 6; 1876, 16.

The Transylvania School of Dental Surgery

was chartered in Kentucky in 1850, and commenced its first session the same year, with the following Faculty:

J. B. Stout, M.D., *Institutes of Dental Science.*

John B. Lindsay, D.D.S., *Principles and Practice of Dental Surgery.*

B. J. Dudley, D.D.S., *Operative and Mechanical Dentistry.*

James S. Drane, M.D., *Special Anatomy, Physiology, and Pathology.*

G. W. Evans, *Dental Chemistry, Hygiene, and Therapeutics.*

Whether this school ever completed more than one session does not appear. The above notice† is all that has been found with regard to it.

The New York College of Dental Surgery,

of Syracuse, was chartered in March, 1852. Its first Faculty consisted of—

A. Westcott, M.D., *Theory and Practice of Dental Surgery and Technology.*

A. B. Shipman, M.D., *Anatomy and General Principles of Surgery.*

Ehrick Parmly, M.D., D.D.S., *Institutes of Dentistry, Dental Hygiene, and Comparative Dental Anatomy.*

Corydon L. Ford, M.D., D.D.S., *Microscopic Anatomy, Physiology, and Pathology.*

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* College Announcement, 1874.

† American Journal of Dental Science, 2d Series, vol. i. p. 107.

R. F. Stevens, M.D., *Chemistry, Materia Medica, and Therapeutics.*

William Dalrymple, D.D.S., *Demonstrator of Operative and Mechanical Dentistry.*

L. G. Bartlett, *Assistant Demonstrator.*

John B. White, M.D., *Demonstrator of Anatomy.*

It is quite possible that, had this school continued in existence, it would have been among the foremost of dental colleges. But, unfortunately, the building in which it was located was destroyed by fire in 1855, and its apparatus, museum, and records were consumed. The college, after this, did not continue.

The Philadelphia College of Dental Surgery

first was chartered in May, 1850.

Previous to this date, five of the members of the Pennsylvania Association of Dental Surgeons shortly after the formation of that Society, in 1845 , attempted to procure the passage of a bill through the Legislature of that State, incorporating a dental college, but were unsuccessful. A short time after the Hon. Jesse R. Burden had procured the charter under which the college was eventually organized, the Pennsylvania Association again appointed a committee to repeat the effort formerly made to procure a charter, they having no knowledge of Mr. Burden's previous success. They subsequently allowed their own petition to drop, and, having come to an agreement with Mr. Burden, nominated the following Faculty, and began the first session in November, 1852:

J. D. White, M.D., D.D.S., *Anatomy and Physiology.*

Ely Parry, M.D., D.D.S., *Chemistry, Materia Medica, and Special Therapeutics.*

Robert Arthur, D.D.S., *Principles of Dental Surgery.*

Elisha Townsend, M.D., D.D.S., *Operative Dentistry, and Dean.*

T. L. Buckingham, M.D., *Mechanical Dentistry.*

D. B. Wright, M.D., *Demonstrator of Surgical and Mechanical Dentistry.*

This college completed only four sessions, during which time there were 63 regular graduates, as follows: 1853, 7; 1854, 19; 1855, 15; 1856, 22. In 1853 there were conferred 22 honorary degrees: in 1854, 7; in 1855, 1; and in 1856, 2; or 32 in all.

The single honorary degree voted for 1855 was conferred by the trustees upon a student who was considered by the Faculty to be incompetent to obtain a regular degree; and the two honorary degrees of 1856 were also given by the trustees, this time in direct opposition to the expressed wishes of the Faculty. These latter thereupon withdrew from their chairs, and the first Philadelphia College ceased to exist.

The Pennsylvania College of Dental Surgery

was chartered in April, 1856. This institution was a consequence of the downfall of the old Philadelphia College, through the efforts of the members of the disbanded Faculty of that school. Its first session commenced in November, 1856, the following being the Faculty:

Elisha Townsend, M.D., D.D.S., *Operative Dental Surgery.*

Ely Parry, M.D., D.D.S., *Chemistry, Materia Medica, and Therapeutics.*

Robert Arthur, D.D.S., *Principles of Dental Surgery, and Dean.*

J. F. B. Flagg, *Anatomy and Physiology.*

T. L. Buckingham, M.D., *Mechanical Dentistry.*

Louis Jack, D.D.S., *Demonstrator of Operative Dentistry.*

Wm. Calvert, D.D.S., *Demonstrator of Mechanical Dentistry.*

The present Faculty is as follows:

T. L. Buckingham, M.D., D.D.S., *Chemistry.*

E. Wildman, M.D., D.D.S., *Mechanical Dentistry and Metallurgy.*

G. T. Barker, D.D.S., *Dental Pathology and Therapeutics, and Dean.*

James Truman, D.D.S., *Dental Histology and Operative Dentistry.*

James Tyson, M.D., *Physiology and Microscopic Anatomy.*

J. Ewing Mears, M.D., *Anatomy and Surgery.*

A. B. Abell, Jr., M.D., D.D.S., *Demonstrator of Mechanical Dentistry.*

Charles W. Meloney, D.D.S., *Demonstrator of Operative Dentistry.*

The candidate for graduation in this college " must have studied under a private preceptor at least two years, including his course of instruction at the college. Attendance on two full courses of lectures, at the *regular or winter sessions* in this institution will be required; but satisfactory evidence of having attended one full course in any respectable dental or medical school will be considered equivalent to the first course of lectures in this college. Also, satisfactory evidence of having been in practice five years, inclusive of the term of pupilage, will be considered equivalent to the first course of lectures."* The student is also required to prepare a dental thesis, to treat thoroughly some patient requiring all the usual dental operations, to take up and complete at least one artificial case, and prepare and deposit in the college collection a specimen case. All the operations must be performed at the college building.

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* College Announcement for 1875–6.

The number of regular graduates, and honorary and other degrees conferred, to date, by this college is as follows:

Regular graduates,—1857, 13; 1858, 15; 1859, 25; 1860, 21; 1861, 36; 1862, 19; 1863, 20; 1864, 17; 1865, 29; 1866, 33; 1867, 26; 1868, 31; 1869, 24; 1870, 38; 1871, 38; 1872, 26; 1873, 28; 1874, 34; 1875, 27; 1876, 31. Total regular graduates, 531.

Honorary degrees,—1858, 1; 1863, 2; 1865, 5; 1872, 2. Total honorary degrees, 10.

Degrees "on time and examination,"—1866, 3; 1867, 23; 1868, 2; 1869, 4; 1870, 3; 1872, 1. Total degrees "on time and examination," 36. Total degrees conferred, 577.

The Philadelphia Dental College

was chartered and began its first session in 1863. Its first Faculty was as follows:

J. H. McQuillen, M.D., D.D.S., *Anatomy, Physiology and Hygiene, and Dean.*

J. Foster Flagg, D.D.S., *Institutes of Dentistry.*

C. A. Kingsbury, M.D., D.D.S., *Dental Physiology and Operative Dentistry.*

Thomas Wardwell, M.D., D.D.S., *Mechanical Dentistry and Metallurgy.*

Henry Morton, A.M., *Chemistry.*

Geo. W. Ellis, M.D., D.D.S., *Demonstrator of Operative Dentistry.*

Wm. Gorges, D.D.S., *Demonstrator of Mechanical Dentistry.*

The present Faculty is constituted by—

J. H. McQuillen, M.D., D.D.S., *Physiology, and Dean.*

Harrison Allen, M.D., *Anatomy and Surgery.*

D. D. Smith, D.D.S., *Mechanical Dentistry and Metallurgy.*

S. B. Howell, M.D., *Chemistry and Materia Medica.*

T. C. Stellwagen, M.D., D.D.S., *Dental Pathology and Operative Dentistry.*

Edward L. Hewitt, D.D.S., *Demonstrator of Operative Dentistry.*

Alonzo Boice, D.D.S., *Demonstrator of Mechanical Dentistry.*

Wm. Williamson, D.D.S., *Assistant Demonstrator.*

The candidate for graduation in this college "must have had two years' private tuition [for which attendance upon the Spring and Fall courses will be regarded as equivalent], and attended two full Winter courses of lectures in a respectable dental or medical college, one of which shall have been in this institution; but certified evidence of having had five years' practice in dentistry, inclusive of pupilage, will be regarded as equivalent to one course of lectures. He must present to the Dean a thesis on some subject relating to dental theory or practice; demonstrate to the Professors of operative and mechanical dentistry his *practical* acquirements in these departments; and deposit a specimen of mechanical dentistry in the museum of the institution, made by himself in the college Laboratory. . . . The Faculty give formal notice to the profession that after the session 1876–7 (closing February 28th, 1877) five years' practice will not be regarded as an equivalent for one course of lectures, and that attendance upon two full winter courses of lectures will be required of all candidates for graduation."*

The regular graduates of this college to date, are numerically as follows: In 1864, 6; 1865, 15; 1866, 16; 1867, 30; 1868, 20; 1869, 25; 1870, 41; 1871, 36; 1872, 32; 1873, 49; 1874, 30; 1875, 41; 1876, 44. Total, 385.

The New York College of Dentistry

was chartered in 1865, and began its first session in November, 1866. The Faculty at that time was as follows:

Eleazer Parmly, M.D., D.D.S., *Emeritus Institutes of Dentistry.*

William H. Dwinelle, M.D., D.D.S., *Dental Science and Operative Dentistry.*

Norman W. Kingsley, *Dental Art and Mechanism, and Dean.*

J. Smith Dodge, Jr., M.D., D.D.S., *Dental Pathology and Therapeutics.*

Faneuil D. Weisse, M.D., *Descriptive and Comparative Anatomy.*

Rufus King Browne, M.D., *Experimental Physiology and Microscopy.*

Charles A. Seely, A.M., *Chemistry and Metallurgy.*

D. H. Goodwillie, M.D., D.D.S., *Demonstrator of Operative Dentistry.*

R. M. Streeter, *Demonstrator of Mechanical Dentistry.*

Alex. W. Stein, M.D., *Demonstrator of Anatomy.*

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* College Announcement, 1874.

The present Faculty is as follows:

Faneuil D. Weisse, M.D., *Regional Anatomy and General Pathology.*

Frank Abbott, M.D., *Operative Dentistry and Oral Surgery, and Dean.*

Alex. W. Stein, M.D., *Histology, Visceral Anatomy, and Physiology.*

F. Le Roy Satterlee, M.D., Ph.D., *Chemistry, Materia Medica, and Therapeutics.*

C. A. Marvin, D.D.S., *Mechanical Dentistry.*

William H. Allen, *Clinical Operative Dentistry.*

John Allen, D.D.S., *Clinical Mechanical Dentistry.*

William B. Hurd, D.D.S., *Clinical Operative Dentistry.*

John T. Metcalf, *Clinical Operative Dentistry.*

Wm. T. Laroche, D.D.S., *Clinical Operative Dentistry.*

J. Bond Littig, D.D.S., *Clinical Mechanical Dentistry.*

D. W. Williamson, D.D.S., *Demonstrator of Operative Dentistry.*

A. Rust Cuyler, D.D.S., *Demonstrator of Mechanical Dentistry.*

S. Frank Johnson, D.D.S., Geo. M. Eddy, D.D.S., *Assistant Demonstrators.*

C. P. Kreizer, M.D., *Assistant in Chemistry, Materia Medica, and Therapeutics.*

The requisites for graduation, as given in the College Announcement for 1875, were as follows: "Students shall be required to have spent two full years in the study and practice of dentistry, inclusive of attendance on two full sessions of lectures in a recognized dental college, one of which shall have been in this institution, before receiving their diploma. [Satisfactory evidence of having had five years' practice in dentistry, ... inclusive of pupilage, will, after one course of lectures in this college, entitle the candidate to an examination for graduation.] The candidate for graduation must deposit a specimen of mechanical dentistry in the museum of the college, made by himself in the institution, and pass satisfactorily a written and oral examination by the Faculty, and a practical examination before the professors of Operative and Mechanical Dentistry. A graduate of medicine shall be accredited one course of lectures."

That part of the above included in brackets is now abrogated, in consequence of the following action of the Faculty, taken April 22d, 1874: "*Resolved*, That, in the judgment of the Faculty, the time is rapidly approaching when all candidates for the degree of D.D.S. shall be required to attend two full courses of lectures before examination. It is therefore determined to continue the above rule (respecting practitioners of five years) for two years only from this time," etc. The remainder of the requirements noted above constitute those now in force.

The number of graduates of this college, to date, is as follows: In 1867, 9; 1868, 9; 1869, 12; 1870, 8; 1871, 8; 1872, 12 (one female); 1873, 10; 1874, 9; 1875, 16; 1876, 27. Total graduates, 120.

This college is empowered to confer two degrees,—that of D.D.S. and that of F.C.D. (Fellow of the College of Dentistry). The last has been conferred only four times, and constitutes the honorary degree. Thus this school has conferred, in all, 124 degrees.

There is, also, a "Faculty prize," consisting of a complete set of dental instruments, to be awarded to the graduate who passes the best examination, written and oral, and presents the best piece of artificial work. This prize was founded in 1870, and has been awarded to seven graduates.

The Missouri Dental College

was founded in 1866, its location being in St. Louis. The first Faculty consisted of Drs. H. Judd, H. E. Peebles, W. H. Eames, J. T. Hodgson, A. Litton, C. W. Stevens, F. W. White, and E. H. Gregory.

The present Faculty is as follows:

W. H. Eames, D.D.S., *Institutes of Dental Science, and Dean.*

J. J. McDowell, M.D., *General Descriptive and Surgical Anatomy.*

A. Litton, M.D., *Chemistry and Pharmacy.*

C. Baumgarten, M.D., *Physiology and Medical Jurisprudence.*

J. S. B. Alleyne, M.D., *Materia Medica and Therapeutics.*

E. H. Gregory, M.D., *Principles and Practice of Surgery, and Clinical Surgery.*

Isaiah Forbes, D.D.S., *Surgical and Operative Dentistry.*

M. A. Bartleson, D.D.S., *Mechanical Dentistry.*

Homer Judd, M.D., D.D.S., *Lecturer on Histology and Pathology.*

H. H. Mudd, M.D., *Demonstrator of Anatomy.*

R. H. Mace, D.D.S., *Demonstrator of Operative Dentistry.*

H. H. Keith, D.D.S., *Demonstrator of Mechanical Dentistry.*

The requisites for graduation in this school comprehend,—that the candidate must have been engaged in the study of dentistry for two years, course included; that he shall have attended two full courses in this school,—for one of which, however, "attendance on a regular course in some other respectable and generally accredited dental school" will be deemed an equivalent; and that he "undergo a satisfactory examination on all the branches taught in this college, and write an acceptable thesis in the English, Latin, French, or German language, on some subject connected with dentistry."*

The regular graduates of this college, to date, are numbered as follows: In 1867, 12; 1868, 2; 1869, 12; 1870, 4; 1871, 7; 1872, 6; 1873, 5; 1874, 7; 1875, 6; 1876, 4. Total, 65.

The New Orleans Dental College

was chartered March 1st, 1861, and commenced its first regular session on the 25th of November of the same year. Its first Faculty was as follows:

John S. Clarke, D.D.S., *Dental Theory and Practice, and Dean.*
James S. Knapp, D.D.S., *Operative Dental Surgery.*
George J. Friedrichs, D.D.S., *Mechanical Dentistry.*
N. B. Benedict, M.D., *Anatomy and Physiology.*
Sanford S. Riddle, M.D., *Chemistry and Metallurgy.*
N. B. Benedict, M.D., *Materia Medica and Special Therapeutics.*
A. F. McLain, M.D., D.D.S., *Demonstrator of Operative Dentistry.*
W. S. Chandler, D.D.S., *Demonstrator of Mechanical Dentistry.*

The present Faculty is as follows:

Wm. S. Chandler, D.D.S., *Operative Dental Surgery.*
James S. Knapp, D.D.S., *Theory and Practice.*
Andrew F. McLain, M.D., D.D.S., *Institutes of Medicine and Dentistry, and Special Therapeutics, and Dean.*
Chas. E. Kells, D.D.S., *Science of Dental Mechanism.*
Alfred W. Perry, M.D., *Chemistry.*
John G. Angell, D.D.S., *Operative Dental Surgery.*
Frederick Loeber, M.D., *Anatomy and Physiology.*
Andrew F. McLain, M.D., D.D.S., *Dental Materia Medica.*
Martin Viet, D.D.S., *Demonstrator of Clinical Dentistry.*

Candidates for graduation in this college are required to attend two full courses of lectures, the last of which must be in this school, "exclusive of the usual two years' office pupilage." Graduates in medicine, or dentists of five years' respectable actual practice, need attend only the last course. The Faculty reserves to itself the right to "cancel diplomas to graduates of this college who are guilty of *un-*

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* College Announcement, 1875.

professional conduct, charlatanism, or any illicit practices calculated to bring discredit upon the dental profession."*

A numerical account of the graduates of this college is as follows: In 1868, 4 regular, 5 honorary; 1869, 9 regular; 1870, 5 regular, 17 honorary; 1871, 5 regular, 5 honorary; 1872, 11 regular, 4 honorary; 1873, 3 regular, 2 honorary; 1874, 4 regular, 2 honorary; 1875, 1 regular; 1876, 1 regular. Total, 43 regular, and 35 honorary degrees,† or 78 total.

The Dental School of Harvard University

(Boston) was founded in 1867. Its first Faculty was as follows:

Thomas Hill, M.D., *President.*
Oliver Wendell Holmes, M.D., *Anatomy.*
Henry James Bigelow, M.D., *Surgery.*
John Bacon, M.D., *Chemistry.*
Nathan C. Keep, M.D., *Mechanical Dentistry.*
Thomas B. Hitchcock, M.D., *Dental Pathology and Therapeutics.*
George T. Moffatt, M.D., *Operative Dentistry.*
Luther D. Shepard, D.D.S., *Adjunct in Operative Dentistry.*
Nathaniel W. Hawes, *Demonstrator of Operative Dentistry.*
Charles B. Porter, *Demonstrator of Anatomy.*
Samuel F. Horn, D.M.D., *Demonstrator of Mechanical Dentistry.*

The present Faculty is as follows:

Charles W. Eliot, LL.D., *President.*
Thomas H. Chandler, D.M.D., *Mechanical Dentistry, and Dean.*
Oliver Wendell Holmes, M.D., *Anatomy.*
Henry J. Bigelow, M.D., *Surgery.*
——— ———, *Dental Pathology and Therapeutics.*
George T. Moffatt, M.D., D.M.D., *Operative Dentistry.*
Luther D. Shepard, D.D.S., *Adjunct in Operative Dentistry.*
Nathaniel W. Hawes, *Assistant in Operative Dentistry.*
Henry P. Bowditch, M.D., *Assistant in Physiology.*
Charles B. Porter, M.D., *Demonstrator of Practical Anatomy.*
Edward S. Wood, M.D., *Assistant in Chemistry.*
Charles A. Brackett, D.M.D., *Instructor in Dental Therapeutics.*

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* College Announcement, 1874.

† This school has issued three classes of honorary degrees; "Doctor of Dental Surgery" (81 conferred); "Ad eundem" (1 conferred); "Fellow of the College of Dentistry" (8 conferred).

William Herbert Rollins, D.M.D., *Instructor in Dental Pathology.*

Charles Wilson, D.M.D., *Demonstrator in Charge.*

George F. Grant, D.M.D., *Demonstrator of Mechanical Dentistry.*

The scheme of instruction and the necessary qualifications for graduation in this school were originally generally similar to those of other dental schools. The latter were, at first, that the candidate "shall have pursued his professional studies three years under competent instructors, and attended two full courses in this institution, except that a certificate of attendance upon one course of lectures in any respectable dental or medical college may be considered a substitute for the first course; provided such candidate maintain a thesis,"* etc.

The scheme of instruction, however, has been latterly changed, and is now as given below:

"From and after September 28th, 1876, instruction will be given in the Harvard Dental School by lectures, recitations, clinical teaching, and practical exercises, uniformly distributed throughout the academic year, and the distinction of winter and summer sessions will thereafter be abolished. The year will begin on the Thursday following the last Wednesday in September, and end on the last Wednesday in June. It will be divided into equal terms, with a recess of one week between them. . . . The course of instruction will be progressive, extending over two years. . . . Every candidate for the degree . . . . must give evidence of having studied medicine or dentistry three full years; he must have spent at least one continuous year at this school, have presented a satisfactory thesis, and have passed all the required examinations. The Faculty recommend those who propose to take the degree to spend the whole of the required term of three years of study in the school. But those who wish to spend but two of the three years in the school are earnestly advised to pass their first year of study, before entering, under the direction of a *competent* private instructor."†

This school does not give the ordinary degree of "Doctor of Dental Surgery." Its degree is "*Dentariæ Medicinæ Doctor*" (D. M.D.), "Doctor of Dental Medicine."

Its graduates, to date, are numbered as follows: In 1869, 5; 1870, 12; 1871, 6; 1872, 15; 1873, 5; 1874, 8; 1875, 5; 1876, 7. Total, 63.

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* College Announcement, 1875.

† Ibid., 1875–6.

The Boston Dental College

was founded in June, 1868, and began its first regular session in September of the same year. Its first Faculty was constituted thus:

Wm. H. Atkinson, M.D., D.D.S., *Hygiene and Dental Jurisprudence.*

Ambrose Lawrence, M.D., D.D.S., *Institutes of Dentistry.*

W. S. Miller, D.D.S., *Adjunct, Institutes of Dentistry.*

I. J. Wetherbee, D.D.S., *Dental Science and Operative Dentistry.*

C. G. Davis, D.D.S., *Adjunct, Dental Science and Operative Dentistry.*

S. J. McDougall, M.D., *Dental Art and Mechanism.*

H. F. Bishop, D.D.S., *Adjunct, Dental Art and Mechanism.*

R. King Browne, M.D., *Anatomy and Physiology.*

J. P. Ordway, M.D., *Adjunct, Anatomy and Physiology.*

L. R. Sheldon, M.D., *Pathology and Therapeutics.*

J. A. Follett, M.D., *Principles and Practice of Surgery, and Dean.*

F. W. Clark, S.B., *Chemistry and Metallurgy.*

G. M. Pease, M.D., *Demonstrator of Anatomy.*

The present Faculty is as follows:

Isaac J. Wetherbee, D.D.S., *Dental Science and Operative Dentistry.*

Nicholas N. Noyes, D.D.S., *Mechanical Dentistry and Metallurgy.*

Charles H. Spring, M.D., *Anatomy and Physiology.*

Joshua B. Treadwell, M.D., *Principles and Practice of Surgery.*

Elisha Chenery, M.D., *Pathology and Therapeutics, and Dean.*

——— ———, *Chemistry and Physics.*

Robert R. Andrews, D.D.S., *Demonstrator of Microscopical Anatomy.*

Josiah W. Ball, D.D.S.; Fred. A. Locke, D.D.S., *Demonstrators of Operative Dentistry.*

Charles H. Osgood, D.D.S.; Frederick F. Gage, D.D.S., *Demonstrators of Mechanical Dentistry.*

The candidate for graduation in this institution "must have pursued his professional studies three years under a competent instructor and have attended two full courses of lectures in this college. A certificate of attendance upon one course of lectures in any other reputable dental or medical college, or five years of reputable practice, may be considered a substitute for the first course."*

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* College Announcement, 1874-5.

The number of regular graduates of this college is as follows: In 1869, 2; 1870, 23; 1871, 5; 1872, 8; 1873, 6; 1874, 12; 1875, 12; 1876, 11. Total, to date, 79.

The Maryland Dental College

was established in 1873, in Baltimore. Its first Faculty and the present are identical, as follows:

Samuel H. Williams, D.D.S., *Emeritus Institutes of Dentistry.*

Byron F. Coy, D.D.S., *Dental Surgery.*

Henry H. Keech, M.D., D.D.S., *Pathology and Therapeutics.*

M. Whilldin Foster, M.D., D.D.S., *Dental Mechanism and Metallurgy.*

Edward P. Keech, M.D., D.D.S., *Clinical Dentistry and Materia Medica.*

Richard B. Winder, M.D., D.D.S., *Physiology and Hygiene, and Dean.*

Samuel M. Field, D.D.S., *Physics and Chemistry.*

L. McLane Tiffany, M.D., *Anatomy.*

A. P. Gore, D.D.S., *Adjunct, Clinical Dentistry.*

C. T. Brockett, M.D., D.D.S., *Demonstrator of Practical Dentistry.*

H. G. Ulrich, D.D.S.; C. E. Duck, D.D.S., *Demonstrators of Practical Dentistry.*

B. W. Barton, M.D., *Demonstrator of Anatomy.*

This college requires of its candidates for graduation that they shall have attended two full courses of its lectures; except that either graduation in a reputable medical college and one year dental pupilage,—one year in any reputable dental college,—five years' practice, including regular pupilage,—or an acceptable examination on entering the college upon anatomy, physiology, chemistry, and practical dentistry,—will be considered as equivalent to one course in the college. It is also announced that graduates of this school will be accepted as second-course students at the Washington University of Medicine, and at the Baltimore College of Physicians and Surgeons.

The Dean of this college, Dr. R. B. Winder, was elected, in 1868, to fill a chair of Dentistry in the Baltimore Special Dispensary; its Board of Physicians declaring that "Dentistry should hereafter be considered as a surgical specialty in this institution, and placed upon the same footing as the other specialties."*

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* Letter of the Board to Dr. Winder.

The graduates of this school are numbered as follows: In 1874, 10; 1875, 4; 1876, 10. Total, 24.

The Dental College of the University of Michigan

was instituted in 1875, its first session commencing in October of that year. Its Faculty is as follows:

James B. Angell, LL.D., *President.*

Jonathan Taft, D.D.S., *Principles and Practice of Operative Dentistry, and Dean.*

John A. Watling, D.D.S., *Clinical and Mechanical Dentistry.*

Walter H. Jackson, *Demonstrator.*

In addition to the above, students receive instruction in *Anatomy, Physiology, Pathology, Chemistry, Materia Medica, Therapeutics,* and *Surgery* from the Professors of those branches in the "Department of Medicine and Surgery" of the University.

This school requires of its students certain qualifications for admission thereto; the most important being, graduation from "some respectable college, academy, or high school," or matriculation in the University, or an examination "as to his previous education and his fitness for entering upon and appreciating the technical study of medicine."* The conditions of graduation are, that "He must devote three years to the study of his profession, in connection with attendance upon a full course of medical lectures. He must attend two full courses of lectures in the dental college, or one course elsewhere and the last one here. . . . He must sustain an examination satisfactory to the Faculty in all the branches taught. A graduate of the medical college may enter the senior class, and if found qualified may graduate after two years have been devoted to the study of dentistry. A dentist who has been in reputable practice for four years may submit to an examination, and if approved enter the senior class."†

As the term of this college is two years, there have been, thus far, no students graduated from it.

In connection with the University of California there is established a dental school. This was decided upon in 1873, in consequence of action taken in the matter by the California State Dental Society, and the department was afterward established; but as yet no lectures have been given.

About the same year, also, there appeared before the profession the so-called "St. Louis Dental College." This institution appears to have had no real existence as a college, and held no sessions; but degrees were conferred by it—it is said simply upon payment of a sum of money.* An attempt by it to introduce its delegate into the American Dental Association was promptly thwarted, the committee on the subject declaring that "the St. Louis Dental College has no existence except under a technicality of a loose and dangerous statute of the State of Missouri; that it has never attempted to fulfill the spirit of even this bad law, by instituting lectures, clinics, or any other mode of teaching dental science."† The "St. Louis Dental College" soon came to an end.

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* College Announcement, 1875.

† Ibid.

To sum up: There have been founded in this country since 1840, no less than *fifteen* public institutions for the teaching of dentistry. Of these, *twelve* are now in existence. The whole number have granted degrees (as nearly as has been possible to determine) to 2900 persons. It is worthy of note that only *one* of the fifteen schools (the Transylvania School of Dental Surgery, Kentucky) never attained any importance; and that the other two now out of existence (the New York [Syracuse] college, and the first Philadelphia college) became so through causes entirely apart from and unconnected with the system of dental instruction pursued by them.

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* Dental Cosmos, vol. x, p. 310.

† Transactions of the American Dental Association for 1867, p. 18.

DENTAL LEGISLATION.

In the earlier days of American dentistry, although there existed even a greater necessity for some barrier to the promiscuous entrance into the profession of unqualified persons than is now felt, there were insuperable objections, in the minds of even reputable and competent practitioners, to any application for legal protection. Chief among these stood that almost universally predominant feeling of professional jealousy which was so long the barrier to advancement in dentistry in almost every direction. To appeal to public guardianship was to display their modes of practice, not alone to the public and unprofessional eye, but to the scrutiny of, and, perchance, adoption by, the professional brotherhood. Narrow and illiberal as such a view will now appear, it is no less the exact one taken by the general practitioner of fifty years ago, on almost any question connected with his practice. Good dentists were few and isolated, and easily commanded upon their merits all the practice they could care for; and they consequently contented themselves with railing at such dental operators as were, or as they conceived to be, below them in scientific or practical status, being well aware that they were secure in the position they had gained in the public estimation, and caring little for aught else. It will be remembered that we refer to the general practitioner, and do not include some, who, from the earliest dates, appear to have been entirely free from such ignoble motives.

There was another fact which also operated strongly against any movement of the better class of dentists toward legislative protection against empiricism. This was, that the majority of persons practicing dentistry in this country, was, in those times, composed of the very class against which any such enactment would, perforce, have been aimed. This class, although certainly not influential in individuality, was yet so as a whole, and could not be ignored—and might, possibly, not have been overcome—in any contest such as would surely have arisen on the question of dental legislation.

Upon the establishment of dental periodicals and schools, and in consequence of the growth of liberal ideas in the profession, the state of affairs in dentistry gradually changed. A college degree and an official published organ gave to the educated dentist of 1840 and afterward a superiority in the public estimation over the irregular practitioner which he had never before held, and enabled him to concert and complete measures such as would have been exceedingly difficult, if not impossible, to have been carried out, even five years before.

Curiously enough, the first State to pass a dental enactment in this country was Alabama, almost the poorest in skilled dentists at the time of any State in the Union. This legislation (probably the first ever had on the dental specialty) was somewhat anomalous, placing the keeping of dental interests entirely in the hands of the general surgeon and physician. The old and now well-known objections to such a course operated then much more actively than they do at present. Said Dr. Harris,*—"The insuperable objection to committing the interests of dental surgery into the keeping of the general surgeon and the physician is, that gentlemen who are only medically educated, as far as it regards dental surgery are oftentimes as ignorant as the most unlearned. The medical colleges have never taught this branch of surgery in its most important and difficult operations, and hundreds of students are graduated yearly who do not really know how to extract a tooth scientifically." It is worthy of note that Dr. Harris, in conclusion of the above remarks, outlined almost exactly the present system of associated dentistry more than thirty years ago. He adds, referring to the Alabama law,—"Much may be done, even in this way, but the true remedy lies in the general union of educated dentists in a central association, aided and sustained by State societies. Such, acting with as much power from the State laws as surgeons and physicians have, will be able to make the profession honorable, respectable, and useful."

The act of Alabama was approved December 31st, 1841. It was as follows:

ALABAMA.

"*An Act Regulating the Practice of Dental Surgery, and for other purposes.*

"*Section* 1. Be it enacted by the Senate and House of Representatives of the State of Alabama, in General Assembly convened, That from and after the first Monday in December next, it shall be the duty of each of the medical boards of this State to examine and license applicants to practice dental surgery, under the same rules and regulations, and subject to the same restrictions as those who apply for license to practice medicine; and, in order more fully to carry this act into effect, it shall be the duty of each of the medical boards, where the same is practicable, to add to their body, by election, a professional dentist having the requisite qualifications, which dentist so added shall constitute a part of the board.

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* American Journal of Dental Science, 1st Series, vol. iii. p. 291.

"*Section* 2. And be it further enacted, That if any person styling himself as dentist, or other person, shall engage in the practice of dental surgery as a professional business, after the aforesaid first Monday in December next, without having been regularly licensed so to do by one of the medical boards of this State, as hereinbefore provided for, for every such offense shall forfeit and pay a sum not exceeding fifty dollars, recoverable before any court having jurisdiction of the same, one-half to the informer, the other half to the county where suit is brought.

"*Section* 3. And be it further enacted, that all bonds, notes, or promissory obligations, or assumpsits, made to any person or persons not authorized as provided for in this act, the consideration of which shall be for services rendered as a professional dentist, or in the line of professional dentistry, shall be utterly void and of no effect; *Provided*, the provisions of this act shall not be so construed as to prevent persons from practicing dental surgery who have a license to practice surgery and medicine, from either of the medical boards of this State, or diploma from any regularly constituted institution in the United States.

"*Section* 4. And be it further enacted, That hereafter it shall be the duty of all practicing physicians, surgeons, and dentists, to have their licenses recorded in the office of the Clerk of the County Court in which they may reside, and the certificate of the clerk shall be considered as good evidence in any court of the right of any individual having a diploma or license to practice his profession, and recover his debts for the same.

"*Section* 5. And be it further enacted, That all laws, and parts of laws, contravening the provisions of this act, be and the same are hereby repealed."

What success the above enactment met with during the long time it was in force (it is believed, to the opening of the late civil war), cannot now be ascertained. Its effects were, probably, more in the suppression of irregular practitioners than in the elevation of the standard of professional acquirements in dentistry. The latter, in fact, has proved an exceedingly difficult operation, through legislative action, in later days and with the most approved form of law; and great success in this direction cannot be expected of so crude a statute, and in times such as were those in which it was passed.

The newer order of thought and ethics introduced by and with journalism and educational institutions was itself so powerful an educator, both of the profession and the public, that any necessity for legal status appears to have been small, or at least lightly felt, for many years.

Dentistry, after 1840, had acquired such importance and generally accorded scientific standing as it had never before known. The graduates of dental colleges multiplied, and the class of good—or, at least, tolerable—dentists became almost as nearly the rule as it had formerly been the exception. Under these circumstances dentistry rested for a period of about twenty-five years.

About 1865, there arose a series of circumstances certainly not contemplated by those who have been affectionately denominated the "fathers of American dentistry." This subject is designed to be more fully treated in the chapter on "Dental Education," and will not, therefore, be further alluded to here. Suffice it to say, that satisfactory *self*-government in dentistry appeared to have, at that time, fulfilled its possibilities; and the profession cast about for some method which should replace it to a better end. This appears to have been partially effected, at least, by resort to the original method put in operation by Alabama, twenty-five years before.

Several of the States, notably Kentucky, Pennsylvania, and New York, attempted to procure legislative action on dentistry, about 1860–68. Kentucky failed entirely; and her State Society is now organized under a special act of incorporation.* Pennsylvania has finally succeeded, after much labor and several rebuffs. New York was the first after Alabama to procure a special legislative enactment relative to dentistry.

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* In 1867, certain prominent dentists of that State undertook the passage of an act, which provided, among other things, that it should be unlawful for any but holders of diplomas of dental colleges, or certificates of an examining board, to practice dentistry; and instituting fines for the breaking of the proposed law, making the single exception to the above that the act should not "prevent physicians and surgeons from extracting teeth." See Dental Cosmos, vol. viii. p. 6[illegible]4.

NEW YORK.

So far have been developed two classes of such laws. The act first in force in Alabama, and those of Ohio, New Jersey, Georgia, and Pennsylvania may be denominated "prohibitory" laws; that is, they seek, by stringent provisions, under heavy penalties, to forcefully prevent the practice of dentistry by any except regularly authorized persons. That of New York forms a class by itself, its object being, in the language of its founders, to "seek thorough organization and the establishment of proper standards, ... without the enactment of penalties for the infringement of the State Society's regulations,—a law which seeks rather to mould public opinion than to repress the unqualified,—which endeavors to elevate the incompetent, rather than to drive him from practice." *

The multiplication of dental societies in this State proved to be the first indication of the need for organized professional effort there. An entire want of unanimity of opinion or organized action on any matter of importance, was felt to be a great obstacle to professional advancement; and the absence of any standard of qualification for admission to the brotherhood was recognized as a serious evil, which demanded prompt remedy. It was said, and justly,—"Law, Medicine, and Divinity have each their barriers erected; having passed which, the student becomes at once the professional brother, but outside which he is, in no case, recognized or given the hand of fellowship. But Dentistry has no line of demarcation by which to separate the competent from the incompetent,—no standard of qualifications,—and no clearly defined limits. . . . Law, Medicine, and Divinity, themselves in possession of the immunities of centuries, are distrustful of the profession which has no organized existence and no responsible head. Any man may, at his option, become a dentist. There is no obstruction to prevent the ingress of the unworthy, and no code of ethics such as will prevent fraternization with them."†

Such points of moment as these could not fail to engage the serious consideration of the best men. The various local societies began to give expression to their ideas of reform by the appointment of committees to agitate the subject of a deliverance from the evils which beset them. The Buffalo Dental Society finally took the step of calling a general convention of State practitioners; and the result was

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* Manuscript of Dr. Barrett in the possession of the author.

† Mss. of Dr. Barrett.

the passage of the following act in the Legislature, which was signed by the Governor, April 7th, 1868:

"*An Act to incorporate Dental Societies for the purpose of Improving and Regulating the Practice of Dentistry in this State.*

"The People of the State of New York, represented in Senate and Assembly, do enact as follows:

"Section 1. It shall be lawful for the dentists in the several judicial districts of the supreme court of this State, to meet together at the following named places, to wit: In district number one, at the Cooper Institute, in the city of New York; district number two, at the City Hall, in the city of Brooklyn; district number three, at the Delavan House, in the city of Albany; district number four, at the Clarendon Hotel, Saratoga Springs; district number five, at the Stanwix Hall Hotel, in the village of Rome; district number six, at the Lewis House, in the village of Binghamton; district number seven, at the Canandaigua House, in the village of Canandaigua; district number eight, at the Medical Hall, in the city of Buffalo; on the first Tuesday of June, eighteen hundred and sixty-eight, at two o'clock in the afternoon; that the said such dentists so convened as aforesaid, or any part of them, not less than fifteen in number, shall proceed to the choice of a president, vice-president, secretary, and treasurer, who shall hold their offices for one year and until others shall be chosen in their places; and whenever said societies shall be organized as aforesaid, they are hereby constituted bodies corporate, in fact and under the names of the District Dental Society of the respective judicial districts where they shall be located; provided always, that if the dentists residing in any district shall not meet and organize themselves as aforesaid, it shall be lawful for them, at the call of fifteen dentists residing in such district, to meet at such other time and place as they shall designate; and their proceedings shall be as valid as if such meeting had been at the time before specified.

"Section 2. Each of said district societies, when organized as aforesaid, shall send eight delegates, who shall meet at the Capitol, in the city of Albany, on the last Tuesday of June, eighteen hundred and sixty-eight, for the purpose to organize a State dental society, which shall be named 'The Dental Society of the State of New York;' and, being not less than fifteen in number, shall proceed [illegible], and shall [illegible] a president, vice-president, secretary and treasurer, who shall hold their offices for one year and until others shall be chosen in their places, and said

Society shall be a body corporate, under the name and style as aforesaid.

"*Section* 3. The secretaries of each of the district societies shall lodge, in the county clerk's office of some county within their district, a copy of all the proceedings and records of their organization; and it shall also be the duty of the secretary of the State Dental Society, in like manner, to lodge, in the office of the Secretary of State, a copy of its records and proceedings had at the organization thereof; and the said county clerks, respectively, and the Secretary of State shall file the same in their respective offices, and shall receive therefor a fee of ——.

"*Section* 4. At the first meeting of said State Dental Society, the same being duly organized as aforesaid, the delegation from each district society shall be divided into four classes of two delegates each, who shall serve one, two, three, and four years respectively, and until others shall be elected in their places, and the said district societies, at each annual meeting thereafter, shall choose two delegates to the State Society, to serve each four years, and fill all vacancies in their respective delegations that may have occurred by death or otherwise.

"*Section* 5. Each of the incorporated dental colleges of this State may annually elect two delegates to the State Dental Society, who shall be entitled to all the privileges, and subject to the same rules and regulations as other delegates.

"*Section* 6. The said State Dental Society may elect permanent members of said Society from among eminent dentists residing in this State, but not to exceed twenty in number, at its first meeting, nor more than five in any one year thereafter, which members so elected shall be entitled to all the privileges of delegate members, but shall receive no compensation for their attendance on meetings of the State Society, except when sent as delegates by the district societies or colleges aforesaid. And the said State Society may elect honorary members from any State or country; but no person shall be elected an honorary member who is eligible to regular membership, nor shall any honorary member be entitled to vote or hold any office in said Society.

"*Section* 7. The several district societies established as aforesaid, at their annual meetings, shall appoint not less than three nor more than five censors, to continue in office for one year, and until others are chosen, who shall constitute a district board of censors, whose duty it shall be carefully and impartially to inquire into the qualifications of all persons who shall present themselves within the districts where they reside, for examination, and report their opinion, in writing, to the president of said district society, who shall thereupon issue, on the recommendation of said board of censors, a certificate of qualification to such person or persons, countersigned by the secretary, and bearing the seal of the said district society.

"*Section* 8. The State Dental Society organized as aforesaid, at its first meeting shall appoint eight censors, one from each of the said district societies, who shall constitute a State board of censors, and at the first meeting of said board the members shall be divided into four classes, to serve one, two, three, and four years respectively, and said State Dental Society shall, at each annual meeting thereafter, appoint two censors, to serve each four years and until their successors shall be chosen, and fill all vacancies that may have occurred in the board by death or otherwise. Each district society shall be entitled to one and only one member of said board of censors. Said board of censors shall meet at least once in each year, at such time and place as they shall designate; and being thus met, they, or a majority of them, shall carefully and impartially examine all persons who are entitled to examination under the provisions of this act, and who shall present themselves for that purpose, and report their opinion in writing to the president of said State Dental Society, and on the recommendation of said board it shall be the duty of the president, aforesaid, to issue a diploma to such person or persons, countersigned by the secretary, and bearing the seal of said Society.

"*Section* 9. All dentists in regular practice at the time of the passage of this act, and all persons who shall have received a diploma from any dental college in this State, and all students who shall have studied and practiced dental surgery with some accredited dentist or dentists for the term of four years, shall be entitled to an examination by said board of censors. Deductions from such term of four years shall be made in either of the following cases:

"1. If the student, after the age of sixteen, shall have pursued any of the studies usual in the colleges of this State, the period, not exceeding one year, during which he shall have pursued such studies shall be deducted.

"2. If the student, after the age of sixteen, shall have attended a complete course of lectures of any incorporated dental or medical college in this State, or elsewhere, one year shall be deducted.

"*Section* 10. Every person on receiving a diploma from the State Dental Society shall pay into the treasury thereof the sum of twenty dollars, and on receiving a certificate of qualification from the dental society of any district the sum of ten dollars into the treasury thereof.

"*Section* 11. The dental societies of the respective districts, and the Dental Society of the State, may purchase and hold such real and personal estate as the purposes of their respective corporations may require. The district societies each not exceeding in value the sum of five thousand dollars, and the State Dental Society not exceeding twenty thousand dollars in value.

"*Section* 12. The respective societies herein provided for may make all needful by-laws, rules, and regulations, not inconsistent with any existing law, for the management of the affairs and property of said societies respectively, and providing for the admission and expulsion of members, provided that such by-laws, rules, and regulations of the respective district societies shall not be repugnant to nor inconsistent with the by-laws, rules, and regulations of the State Dental Society.

"*Section* 13. All dentists who shall have been in regular practice in this State at the time of the passage of this act, and all persons who shall have received a certificate of qualification from any district society, shall be eligible to membership in said district societies.

"*Section* 14. The Dental Society of the State of New York shall be entitled to all the privileges and immunities granted to the Medical societies of this State.

"*Section* 15. This act shall take effect immediately."

In this enactment the State Society (convened and organized according to the law) perceived an omission,—authorization to confer a degree with the diploma. This was conceived to be necessary, in order to put non-graduates of colleges on an equal footing with graduates. Accordingly, at the next meeting of the Legislature, in 1869, was presented and passed the following amendment to the original law:

"*An act to amend an act entitled 'An Act to incorporate dental societies, for the purpose of Improving and Regulating the Practice of Dentistry in this State.'*

"The people of the State of New York, represented in Senate and Assembly, do enact as follows:

"*Section* 1. Section eight of the act entitled 'An Act to incorporate dental societies, for the purpose of improving and regulating the practice of dentistry in this State,' is hereby amended so as to read as follows:

"'*Section* 8. The State Dental Society, organized as aforesaid, at its first meeting shall appoint eight censors, one from each of the said district societies, who shall constitute a State board of censors, and at the first meeting of the said board, the members shall be divided into four classes, to serve one, two, three, and four years respectively; and said State Dental Society shall, at each annual meeting thereafter, appoint two censors, to serve each four years, and until their successors shall be chosen, and fill all vacancies that may have occurred in the board by death or otherwise. Each district Society shall be entitled to one, and only one, member of said board of censors. Said board of censors shall meet at least once in each year, at such time and place as they shall designate; and being thus met, they, or a majority of them, shall carefully and impartially examine all persons who are entitled to examination under the provisions of this act, and who shall present themselves for that purpose, and report their opinion in writing to the president of said State Dental Society, and on the recommendation of the said board, it shall be the duty of the president aforesaid to issue a diploma to such person or persons, countersigned by the secretary and bearing the seal of said Society, conferring upon him the degree of "Master of Dental Surgery" (M.D.S.); and it shall not be lawful for any other society, college, or corporation to grant to any person the said degree of "Master of Dental Surgery."'

"*Section* 2. Any person who shall knowingly or falsely claim or pretend to have or hold a certificate of license, diploma, or degree, granted by any society organized under and pursuant to the provisions of this act, or who shall falsely and with intent to deceive the public, claim or pretend to be a graduate from any incorporated dental college, not being such graduate, shall be deemed guilty of a misdemeanor.

"*Section* 3. This act shall take effect immediately."

Under this law were formed one main and eight district societies, as required by it, and as noted in the chapter on "Dental Associations." The degree (M.D.S.) has been generally carefully conferred, and many dentists, in former practice without any degree, have availed themselves of the provisions of the act in this direction. Another valuable feature exists in section fourteen of the act. Under this section the State publishes, annually and gratuitously, at least eight hundred copies of the transactions of the main society. Since 1869 these volumes have been issued in their order, at no cost to the profession. The act thus offers facilities for dental publication unequaled by any other yet in force.

OHIO.

Following in the steps of New York, this State was the third to pass legislative enactments relative to dentistry. Further than immediate succession in point of time, however, the law of Ohio does not resemble that of the former State; for it is, perhaps, the most rigorously enforced of any of the class of prohibitory acts. The following is the text of the original act:

"*A Law to Regulate the Practice of Dentistry in the State of Ohio.*

"*Section* 1. Be it enacted by the General Assembly of the State of Ohio, That it shall be unlawful for any person to practice dentistry in the State of Ohio for compensation, unless such person has received a diploma from the Faculty of a Dental College duly incorporated under the laws of this or any other State of the United States or foreign country, or a certificate of qualification issued by the State Dental Society or by any local society auxiliary thereto; provided that nothing in this section shall apply to persons now engaged in the practice of dentistry in this State before the first day of January, 1873.

"*Section* 2. Any person who shall practice dentistry without having complied with the regulations of this Act, shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be fined not less than fifty or more than two hundred dollars; provided that nothing in this Act shall be construed to prevent physicians and surgeons from extracting teeth.

"*Section* 3. All prosecutions under this Act shall be by indictment before the Court of Common Pleas in the County where the offence was committed, and all fines imposed and collected under the provisions of this Act shall be paid into the Treasury of the County where such conviction shall take place, for the use of the common schools within such county.

"*Section* 4. This Act shall take effect and be in force from and after its passage."

The above act was passed, May 8th, 1868; but was afterward amended, as follows:

"*An Act to amend Section One of an Act, entitled 'An Act to Regulate the Practice of Dentistry in the State of Ohio,' passed May 8th,* 1868.

"*Section* 1. Be it enacted by the General Assembly of the State of Ohio, That Section One (1), of the above named act, be so amended as to read as follows: That it shall be unlawful for any person to practice dentistry in the State of Ohio for compensation, unless such person has received a diploma from the Faculty of a Dental College duly incorporated under the laws of this or any other State of the United States, or foreign country, or a certificate of qualification issued by the State Dental Society: provided, that in all cases where any person has been continuously engaged in the practice of dentistry for a period of five years or more, such person shall be considered to have complied with the provisions of this Act, and the Act to which this is amendatory.

"*Section* 2. Any person who shall practice dentistry without having complied with the regulations of this Act, shall be deemed guilty of a misdemeanor, and upon conviction thereof, shall be fined not less than fifty dollars nor more than two hundred dollars; provided, that nothing in this Act shall be construed to prevent physicians and surgeons from extracting teeth.

"*Section* 3. All prosecutions under this Act shall be by indictment before the Court of Common Pleas in the County where the offence was committed, and all fines imposed and collected under the provisions of this Act, shall be paid into the Treasury of the County where such conviction shall take place, for the use of the common schools within such county.

"*Section* 4. That said original Section One (1) be and is hereby repealed.

"*Section* 5. This Act shall take effect and be in force from and after its passage.

"Passed March 10th, 1873."

GEORGIA.

Legislation in this State is of the prohibitory character. The following is a transcript of the law approved August 24th, 1872:

"*An Act to Regulate the Practice of Dentistry, and to Protect the People against Empiricism in relation thereto, in the State of Georgia.*

"*Section* 1. Be it enacted by the General Assembly, that from and after the passage of this act it shall be unlawful for any person to engage in the practice of dentistry in the State of Georgia, unless said person has graduated and received a diploma from the Faculty of a Dental College, chartered under the authority of some one of the United States or foreign governments, or shall have obtained a license from a Board of Dentists, duly authorized and appointed by this Act, to issue such license.

"*Section* 2. That the Board of Examiners shall consist of five (5) dental graduates or practitioners of dentistry, who are members in good standing of the Georgia State Dental Society; provided, that said graduates or practitioners have been practicing in the State of Georgia for a term not less than three (3) years. Said Board shall be elected to serve for two years. The president of said Georgia State Dental Society shall have power to fill all vacancies in said Board for unexpired terms.

"*Section* 3. That it shall be the duty of this Board, first, to meet annually at the time of meeting of the Georgia State Dental Society, or oftener, at the call of any three of the members of said Board. Thirty days' notice must be given of the annual meetings. Secondly, to prescribe a course of reading for those who study dentistry under private instruction. Thirdly, to grant a license to any applicant who shall furnish satisfactory evidence of having graduated and received a diploma from any incorporated dental college, without fee, charge, or examination. Fourthly, to grant license to all other applicants who undergo a satisfactory examination. Fifthly, to keep a book, in which shall be registered the names of all persons licensed to practice dentistry in the State of Georgia.

"*Section* 4. That the book so kept shall be a book of record; and a transcript from it, certified to by the officer who has it in keeping, with the common seal, shall be evidence in any court in the State.

"*Section* 5. That three members of said Board shall constitute a quorum for the transaction of business, and should a quorum not be present on the day appointed for their meeting, those present may adjourn from day to day until a quorum is present.

"*Section* 6. That one member of said Board may grant a license to an applicant to practice until the next regular meeting of the Board, when he shall report the fact, at which time the temporary license shall expire; but such temporary licenses shall not be granted by a member of the Board after the Board has rejected the applicant.

"*Section* 7. That any person who shall, in violation of this Act, practice dentistry in the State of Georgia for a fee or reward, shall be liable to indictment, and, on conviction, shall be fined not less than fifty, or more than three hundred dollars; provided, that nothing in this Act shall be construed to prevent any person from extracting teeth; and provided further, that none of the provisions of this Act shall apply to regular licensed physicians and surgeons.

"*Section* 8. That on trial of such indictment, it shall be incumbent on the defendant to show that he has authority, under the law, to practice dentistry, to exempt himself from such penalty.

"*Section* 9. That one-half of all fines collected shall inure to the informer, and the other half to the educational fund of the county.

"*Section* 10. That all dentists who have been in practice prior to the passage of this Act are exempt from all provisions of the same.

"*Section* 11. Repeals conflicting laws."

We have no means of accurately estimating the value of this law in its results. It appears, however, to be very loosely framed.

NEW JERSEY.

The laws of this State and Georgia are almost exactly similar, as will be seen by the following:

"*An Act to regulate the practice of Dentistry, and to protect the people against empiricism in relation thereto, in the State of New Jersey.*

"1. Be it enacted by the Senate and General Assembly of the State of New Jersey, That from and after the passage of this act it shall be unlawful for any person to engage in the practice of dentistry in the State of New Jersey, unless said person has graduated and received a diploma from the faculty of a dental college, chartered under the authority of some one of the United States or foreign governments, or shall have obtained a certificate from a board of dentists, duly authorized and appointed by this act, to issue such certificates.

"2. And be it enacted, That the board of examiners shall consist of five practitioners of dentistry, who are members in good standing, of the New Jersey State Dental Society; *provided*, that said practitioners have been practicing in the State of New Jersey for a term of not less than three years; said board shall be elected by the New Jersey State Dental Society, to serve for one year; the president of said New Jersey State Dental Society shall have power to fill all vacancies in said board for unexpired terms.

"3. And be it enacted, That it shall be the duty of this board, first, to meet annually at the time of meeting of the New Jersey State Dental Society, or oftener, at the call of any three of the members of said board; thirty days' notice must be given of the annual meetings; secondly, to prescribe a course of reading for those who study dentistry under private instruction; thirdly, to grant a certificate to all applicants who undergo a satisfactory examination; fourthly, to keep a book in which shall be registered the names of all persons having certificates to practice dentistry in the State of New Jersey, after the passage of this act.

"4. And be it enacted, That the book so kept shall be a book of record; and a transcript from it, certified to by the officer who has it in keeping, with the common seal, shall be evidence in any court in the State.

"5. And be it enacted, That three members of said board shall constitute a quorum for the transaction of business, and should a quorum not be present on the day appointed for their meeting, those present may adjourn from day to day until a quorum is present.

"6. And be it enacted, That any person who shall, in violation of this act, practice dentistry in the State of New Jersey for a fee, or reward, shall be liable to indictment, and, on conviction, shall be fined not less than fifty, or more than three hundred dollars; *provided*, that nothing in this act shall be construed to prevent any person from extracting teeth; *and provided further*, that none of the provisions of this act shall apply to regular licensed physicians and surgeons.

"7. And be it enacted, That on trial of such indictment it shall be incumbent on the defendant to show that he has authority, under the law, to practice dentistry to exempt himself from such penalty.

"8. And be it enacted, That one-half of all fines collected shall inure to the informer and the other half to the educational fund of the county.

"9. And be it enacted, That nothing in this act shall apply to persons who shall be engaged in the practice of dentistry in this State at the time of the passage of this act.

"10. And be it enacted, That to provide a fund to carry out the provisions of the third section of this act, it shall be the duty of the board of examiners to collect from all who received the certificate to practice dentistry, the sum of thirty dollars each, of which sum, if there be any remaining after liquidating necessary expenses, the balance shall be paid into the treasury of the said New Jersey State Dental Society, to be kept as a fund for the more perfect carrying out of the provisions of this act; and the board of examiners, for their remuneration, shall receive from the above fund ten dollars per day for each day of actual service.

"11. And be it enacted, That this act shall take effect immediately.

"Approved March 14th, 1873."

This law is said to have had a very beneficial effect in New Jersey.

PENNSYLVANIA.

About the year 1865, the profession in this State began seriously to agitate the subject of dental legislation. The same causes noted as operating to this end in New York, were here of equal force and effect. Authoritative organization was felt to have become a necessity; and the formation of a State society upon a legal status and with legislative guardianship was strenuously advocated. In 1867, the Lake Erie Dental Association had a bill presented, but it was not pushed to a passage. In December, 1868, the State Dental Society was formed, and its first act was to draft a bill to be presented to the Legislature.

But there seem to have been insurmountable difficulties to its success; for neither at the next nor at subsequent meetings of the Legislature was the measure adopted; and it was not until April 17th, 1876, that a dental enactment finally became a part of the law of this State. The following is the act as passed:

"*An Act to regulate the practice of dentistry, and to protect the people against empiricism in relation thereto, in the State of Pennsylvania, and providing penalties for the violation of the same.*

"*Section* 1. Be it enacted by the Senate and House of Representatives of the Commonwealth of Pennsylvania, in General Assembly met, and it is hereby enacted by the authority of the same, That from and after the passage of this act, it shall be unlawful for any person except regularly authorized physicians and surgeons to engage in the practice of dentistry in the State of Pennsylvania, unless said person has graduated and received a diploma from the faculty of a reputable institution where this specialty is taught, and chartered under the authority of some one of the United States, or of a foreign government, acknowledged as such, or shall have obtained a certificate from a board of examiners, duly appointed and authorized by the provisions of this act to issue such certificate.

"*Section* 2. That the board of examiners shall consist of six practitioners of dentistry, who are of acknowledged ability in the profession. Said board shall be elected by the Pennsylvania State

Dental Society at their next annual meeting, as follows: Two shall be elected for one year, two for two years, and two for three years, and each year thereafter two shall be elected to serve for three years, or until their successors are elected. The said board shall have power to fill all vacancies for unexpired terms, and they shall be responsible to said State Dental Society for their acts.

"*Section* 3. That it shall be the duty of this board:

"*First.* To meet annually at the time and place of meeting of the Pennsylvania State Dental Society, and at such other time and place as the said board shall agree upon, to conduct the examination of applicants. They shall also meet for the same purpose at the call of any four members of said board at such time and place as may be designated. Thirty days' notice must be given of the meetings by advertising in at least three periodicals, one of them being a dental journal, and all published within this State.

"*Second.* To grant a certificate of ability to practice dentistry, which certificate shall be signed by said board and stamped with a suitable seal, to all applicants who undergo a satisfactory examination, and who receive at least four affirmative votes.

"*Third.* To keep a book in which shall be registered the names and the qualifications of such, as far as practicable, of all persons who have been granted certificates of ability to practice dentistry under the provisions of this act.

"*Section* 4. That the book so kept shall be a book of record; and a transcript from it, certified to by the officer who has it in keeping, with the seal of said board of examiners, shall be evidence in any court in this State.

"*Section* 5. That four members of this board shall constitute a quorum for the transaction of business, and should a quorum not be present on any day appointed for their meeting, those present may adjourn from day to day until a quorum is present.

"*Section* 6. That any person who shall, in violation of this act, practice dentistry in the State of Pennsylvania, shall be liable to indictment in the court of quarter sessions of the proper county; and, on conviction, shall be fined not less than fifty or more than two hundred dollars. *Provided,* That any person so convicted shall not be entitled to any fee for services rendered, and if a fee shall have been paid, the patient or his or her heirs may recover the same as debts of like amount are now recoverable by law.

"*Section* 7. That all fines collected shall inure to the poor fund of the county in which the prosecution occurs.

"*Section* 8. That nothing in this act shall apply to persons who shall have been engaged in the continuous practice of dentistry in this State for three years or over, at the time of or prior to the passage of this act.

"*Section* 9. That to provide a fund to carry out the provisions of the third section of this act, it shall be the duty of the said board of examiners to collect from those who receive the certificate to practice dentistry the sum of thirty dollars each, of which sum, if there be any remaining after liquidating necessary expenses, the balance shall be paid into the treasury of the said Pennsylvania State Dental Society, to be kept as a fund for the more perfect carrying out of the provisions of this act."

DENTAL LITERATURE.

In this section it is designed to present, in chronological order, the standard and periodical literature of American dentistry. Owing to causes heretofore noted, completeness in this list is not claimed; but it is believed to be, as far as given, accurate.

Original reviews of each work have not been attempted. It is thought that a more interesting chapter, historically considered, will be obtained by recording those published judgments on the works which were given in the periodical or other reviews of the time.

STANDARD WORKS.

"*Practical Observations on the Human Teeth.* By R. Woofendale, Surgeon-Dentist. London, 1783." This author, as before noted, has been uniformly considered and quoted in this work as an American dentist, and his book is therefore here included. It is the earliest of any of the American dental works.

"*A Treatise on the Human Teeth*, concisely explaining their structure, etc."—Skinner, New York, 1801.

"*A Treatise on Dentistry.*—Explaining the Diseases of the Teeth and Gums, with the most effectual means of Prevention and Remedy; to which is added Dentition, with Rules to be observed during that Interesting Period. By B. T. Longbotham, Surgeon-Dentist. Baltimore, 1802." "With a good deal that is fantastic and erroneous, this work contains no little which is worthy of note, and some of his practice is very much in accordance with that of the present day. He proposes the cure of alveolar abscess by laying it open to the bottom, and keeping it open by means of lint dipped in tincture of myrrh, or some stimulating balsam. . . . He recommends filling the roots of teeth, when from any cause, it is not thought advisable to extract them. He mentions having seen sets of teeth retained in the mouth by atmospheric pressure."*

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* Dr. Arthur's review, American Journal of Dental Science, 2d Series, vol. ii. p. 44. The teeth retained as described by Longbotham were put in, probably, by the method introduced by Gardette, in 1800.

"*A Treatise on the Management of the Teeth.* By **Benjamin James**, M.M.S.S., 'Solatium Afflictis.' Boston, 1814." The many foregoing extracts from this book sufficiently explain its character.

"*A Practical Guide to the Management of the Teeth.* Comprising a Discovery of the Origin of Caries, or Decay of the Teeth, with its Prevention and Cure. By L. S. Parmly, Dental Professor. Philadelphia, 1819." "The author, as the title indicates, advances what at the time of this publication was a new theory of the causes of dental caries, which he claims as his own discovery. He attributes caries 'to the relics of what we eat or drink (without regard to quality) being allowed to accumulate, stagnate, and putrefy either in the interstices of the teeth, as is most commonly the case, or else in the indentures on their surfaces, favorable for the lodgment of food.'"*

"*Lectures on the Natural History and Management of the Teeth;* the Cause of their Decay; the Art of Preventing its Accession, and the Various Operations, never hitherto suggested, for the preservation of Diseased Teeth. By L. S. Parmly, Dentist. Second Edition. New York, 1821."

"*An Essay on the Disorders and Treatment of the Teeth.* By Eleazer Parmly, Dentist. Third edition. New York, 1822." "The broad proposition is here laid down, that decay of the teeth is universally caused by the action of external agents; and Dr. P. states that the teeth are predisposed to caries in consequence of their sometimes being of less dense structure, and less capable of resisting the action of the decomposing matter."†

"*The Family Dentist.* Containing a Brief Description of the Structure, Formation, and Diseases of the Human Teeth. By Josiah F. Flagg, M.D., M.S.S., Surgeon-Dentist. Boston, 1822." The objects and scope of this work are indicated by the "advertisement" with which it opens. "1. To give in as few words as possible, a clear description of the structure and formation of the teeth; and to bring to view those circumstances connected with their growth, with which it is important for every individual to be acquainted. 2. To give a brief sketch of the most common diseases to which the teeth are liable; together with such directions, relative to their treatment and preservation, as shall enable the reader to take the necessary care of his own teeth, and, if a parent, to pay proper attention to the teeth of his children. 3. To guard against the injurious practice of ignorant operators; and to remove some of those popular prejudices which prevent many from adopting the only mode of treatment calculated to diminish the liability to disease in these useful and important organs."*

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* Dr. Arthur, American Journal of Dental Science, 2d Series, vol. ii. p. 45.

† Ibid.

"*Treatise on the Structure, Diseases, and Management of the Human Teeth.* By Eleazer Gidney, Dentist. Utica, 1824." Of this work Dr. Arthur says, "The author contends that caries of the teeth is produced by internal, as well as external, causes, but gives preponderance to the latter. He says that the nerve may be deprived of vitality by extremes of heat or cold acting upon the external surface of the sound tooth, and that it will then suppurate and make its way through the substance of the dentine."†

"*Principles of Dental Surgery;* exhibiting a New Method of Treating the Diseases of the Teeth and Gums, etc. By Leonard Koecker, Surgeon-Dentist, Doctor in Medicine and Surgery, etc. London, 1826." This work has been largely quoted in this history, and is sufficiently well known in general to make any review unnecessary.

"*A Physiological Inquiry into the Structure, Organization, and Nourishment of the Human Teeth.* By J. Trenor, M.D., Dentist. New York, 1828." Dr. Arthur writes of this work as follows: "Dr. T. denies that the teeth possess that high degree of organization now generally ascribed to them; and, although he does not regard them as entirely devoid of vitality, places them lowest among the organized tissues. He attributes no other office to the pulp than that of depositing upon its surface layer after layer of bone, by exudation, similar to the process by which the shells of the crustacea are formed, until it is eventually entirely extirpated. The nourishment of the teeth is entirely due, in his estimation, to the peridental membrane, and he regards the extirpation of the pulp as productive of no injury to the tooth, and strongly advocates the practice."‡

"*Observations on Neuralgia, with Cases.* By J. Trenor, M.D., Dentist. New York, (about) 1828." Dr. Arthur says, "Dr. T. takes the ground that neuralgia is caused by inflammation of dense structure, in which, as somewhat in odontalgia, the nerves having no room for exhaustion give rise to those extremely painful symptoms which mark this complaint. . . . His treatment consists in freely laying open the affected part with the lancet. . . . He gives three cases in which the trouble seemed to be caused by the teeth, which, however, were quite healthy; relief was obtained by discovering the spot from which the affection seemed to take origin, and freely laying it open. In these cases the incisions were made inside the mouth, which he advises to be done when it is feasible, in order to avoid leaving a scar in a visible part."*

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* Work cited, p. 3.

† American Journal of Dental Science, 2d Series, vol. ii. p. 46.

‡ Ibid., p. 47.

"*Observations upon the Importance of the Teeth.* By Samuel Sheldon Fitch, M.D., Surgeon-Dentist. Philadelphia, 1828."

"*A System of Dental Surgery.* In three parts. I. Dental Surgery as a Science. II. Operative Dental Surgery. III. Pharmacy connected with Dental Surgery. By Samuel Sheldon Fitch, M.D., Surgeon-Dentist. New York, 1829." This work is the first systematic treatise on dentistry intended for the student which was published in this country. It was not, however, claimed by its author to be more than an extended compilation. The works quoted in it are numerous, but Fox and Koecker receive the largest share of attention. From the very various character of the remainder of the works from which selections for it have been made, it is now valuable principally as a mode of obtaining a comparison with more modern methods.

"*An Essay on Artificial Teeth, Obturators, and Palates,* with the principles for their construction and application. By Leonard Koecker, Surgeon-Dentist, Doctor in Medicine and Surgery, etc. London, 1832." Dr. Chapin A. Harris, in a critical review on this book,† makes, among others, the following extract and remarks: "The pivoting method of inserting artificial teeth next engages his attention, and, ... while many of his views in regard to their application and utility are correct, there are others that are evidently erroneous. For example, ... he says (this method) is '*always attended with more or less irritation.*' That this is very frequently the case we do not deny, but that it is not *always*, hundreds of cases might be adduced to prove; but it is a method of insertion, I am free to admit, which, as Dr. K. correctly observes, 'requires great caution.' When properly done, however, and upon a healthy root, I have no hesitation in saying that it is one of the best and most satisfactory methods that has ever been adopted. . . . The whole work is replete with instruction and valuable information on this part of the art of the dentist; and had the author dwelt a little more minutely on the various manipulations connected with the construction of the various descriptions of artificial teeth on which he has treated, its value would have been greatly enhanced, and, as it is, we regard it as one of the best, if not the very best, treatise extant on the subject in the English language."

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* American Journal of Dental Science, 2d Series, vol. ii. p. 48.

† Ibid., vol. i. p. 180.

"*Remarks on the Importance of the Teeth.* On the Diseases of the Teeth and Gums and on the Diseases produced by Diseased Teeth, with their Modes of Cure, and Directions for forming regular and beautiful Sets of Teeth, and for the Preservation of their Health and Beauty. By Francis B. Chewning, Dentist. Richmond, 1833."

"*An Essay on the Diseases of the Jaws, etc.* By Leonard Koecker. London, 1834."

"*The Family Dentist*, or a Familiar Treatise on the Art of Securing a Beautiful Set of Teeth. By Dr. Homer Bostwick, Dentist. New York, 1835."

"*An Inaugural Dissertation on the Physiology and Diseases of the Teeth.* Submitted to the College of Physicians and Surgeons of New York, and publicly defended for the Degree of Doctor of Medicine, April 6th, 1835. By Shearjashub Spooner, Member of the Montreal Medical Society. New York, 1835."

"*Dentalogia.* A Poem on the Diseases of the Teeth, and their proper remedies. In Five Cantos. By Solyman Brown, A.M., with notes by E. Parmly." This poem is sufficiently familiar to the present practitioner not to require extended notice. Its appearance as above was about 1835, and it was subsequently republished in the "Library" part of the *American Journal of Dental Science*, Vol. I., 1st Series, and again in the succeeding volume.

"*Observations Générales sur l'Importance des Dents.* Par A. L. Plough, Chirurgien-Dentiste à la Nouvelle Orleans. New Orleans, 1836." Dr. Arthur says, "The author states, among other things, this deplorable fact, that in visiting the best schools he had taken occasion to examine the mouths of the pupils, and nearly always found them in the most wretched condition, no attention having apparently been paid to their cleanliness. He further states that he found seventy out of every hundred with diseased teeth, gums affected, and breath fetid."*

"*Guide to Sound Teeth, or a Popular Treatise on the Teeth.* Illustrating the whole judicious management of these organs, from infancy to old age, in which the author will attempt to show that the teeth of all persons, which are constitutionally well formed, and who enjoy good health, may, by proper management and care, be preserved to the end of life. By Shearjashub Spooner, M.D. New York, 1836." In reference to this well-known work, Dr. Arthur says, "This is the most systematic and elaborate popular treatise which had been published up to the time of its appearance. It goes into the subject at large in full detail. . . . In this work Dr. Spooner first made public the fact that arsenious acid would destroy the vitality of the dental pulp."*

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* American Journal of Dental Science, 2d Series, vol. ii. p. 50.

"*A Public Treatise upon the Preservation of the Teeth.* Comprising the most useful Rules for securing their whiteness and beauty, with Observations on the Cause and Prevention and Cure of Caries, and their effect upon the Health. Intended for Families and the Public generally. By M. Overfield. Winchester, 1838."

"*Dental Hygeia.* A Poem on the Health and Preservation of the Teeth. By Solyman Brown, A.M., author of 'Dentalogia,' etc.; with notes. New York, 1838."

"*Observations on the Structure, Physiology, Anatomy, and Diseases of the Teeth.* In two parts; part first by Harvey Burdell, M.D., etc., part second by John Burdell, Dentist. With drawings and illustrations. New York, 1838."

A review of the above by Solyman Brown, A.M.,† states that, "The views of Berzelius, Moriani, Bell, Hunter, Cuvier, De Bloinville, Fox, Meckle, Sabatier, Pliny, Lemaire, Camerarius, Bessot, Good, Mayo, Sir Astley Cooper, Lycurgus, Porphyry, Plutarch, Sir William Temple, Cullen, Lord Bacon, Cheyne, Lambe, and Clark, together with other distinguished authors," are introduced. As the whole work has only ninety-six pages, this will sufficiently illustrate its character. Dr. Brown adds that "One-fifth part of the volume is taken up with remarks and authorities on the subject of the *natural food of man,* as it stands connected with diseases of the dental organs; and whichever side of this contested question the reader is inclined to espouse, he will be at least amused by this part of the treatise."

"*An Essay on the Art of the Manufacture of Mineral, Porcelain, or Incorruptible Teeth.* By Shearjashub Spooner, M.D. New York, 1838."

This work was, for the period, an exhaustive treatise on its subject, and is even yet of value.

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* American Journal of Dental Science, 2d Series, vol. ii. p. 50.

† Ibid., 1st Series, vol. i. p. 19.

"*The Dental Art*, a Practical Treatise on Dental Surgery. By Chapin A. Harris, M.D., Surgeon Dentist. Baltimore, 1839." Dr. Arthur says of this book, "This is the first edition of a work which is now so well known that any abstract of its contents would be a work of supererogation. It was the first entirely original work published in this country for the use of the profession exclusively, and still (1851) stands alone."* In 1845 a second edition, very much enlarged and thoroughly revised, appeared under the title, "*The Principles and Practice of Dental Surgery.* By Chapin A. Harris, M.D., D.D.S." Dr. Arthur says of it, "The work in this form was generally acknowledged to be the best practical treatise on Dental Surgery which had ever appeared in any language."† Since that time, several other editions, by various editors, have been put forth, and the last, in 1871, by Philip H. Austen, M.D., is numbered the seventh. This work has, since 1840, retained a place as a text-book in most of the dental colleges.

In the year 1840, the American Society of Dental Surgeons began publishing, in separate form, a series of essays by some of its members. Those published were as follows:

"On the Utility of Artificial Teeth." By Chapin A. Harris, M.D.

"On Toothache and its Cure." By Vernon Cuyler, M.D.

"On Ulceration of the Fangs of the Teeth, and the Best Methods of Cure." By Elisha Baker, M.D.

"On the Preservation of the First Set of Teeth." By Enoch Noyes.

"On the Importance of Regulating the Teeth of Children during the Progress of the Second Dentition." By Solyman Brown, A.M., M.D.

"On the Importance of Stopping Carious Teeth." By J. H. Foster, M.D.

"On the Dangerous Effects of Salivary Calculus." By Edward Maynard, M.D.

"On the Best Method of Preserving the Natural Teeth." By L. S. Parmly, M.D.

"On the Necessity of Extracting Diseased Teeth." By E. Townsend.

"On the Diseases of the Gums." By Horace H. Hayden, M.D.

"On First Dentition." By Chapin A. Harris, M.D.

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* American Journal of Dental Science, 2d Series, vol. ii. p. 51.

† Ibid.

To what extent these acquired circulation is not known. There are but few of them now in existence.

"*Preservation of the Teeth.* A Family Guide, being Familiar Observations on their Structure and Diseases, with practical illustrations and engravings, embracing the modern improvements in dentistry. By David K. Hitchcock, Surgeon Dentist. Boston, 1840."

"*A Physiological and Pathological Inquiry,* concerning the Physical Characteristics of the Human Teeth and Gums, the Salivary Calculus, the Lips and Tongue, and the Fluids of the Mouth, together with their respective local and constitutional indications. By Chapin A. Harris, M.D., D.D.S. Baltimore, 1841."

"*The Anatomy, Physiology, and Pathology of the Human Teeth,* with the most approved modes of treatment, including operations, and the method of making and setting artificial teeth; with thirty plates. By Paul Beck Goddard, M.D., M.A.N.S., M.A.P.S., etc., etc. Aided in the practical part by Joseph E. Parker, Dentist. Philadelphia, 1844."

"*The Natural History and Diseases of the Human Teeth.* By Joseph Fox, M.R., C.S.L., etc. Remodeled with an introduction and numerous additions. By Chapin A. Harris, M.D., D.D.S. Illustrated with thirty plates. Philadelphia, 1846."

"*A Popular Treatise on the Teeth,* embracing a description of their structure, diseases, etc., together with an account of the usual methods of inserting artificial teeth. By Robert Arthur, Doctor of Dental Surgery, and Fellow of the American Society of Dental Surgeons. New York, 1845."

"*A Popular Treatise on the Teeth, etc.,* by E. G. Kelley, M.D., etc. Boston (2d Edition), 1846." This author "not only shows how directly ill health and imperfect physical training in childhood, operate in the production of subsequent bad teeth, but traces the connection of the latter as the chief cause of much disease and suffering, which none but physicians, and only a few of them, fully realize." *

"*A Practical Treatise on the Operations of Surgical and Mechanical Dentistry.* By Samuel C. Harbert, Surgeon Dentist. Philadelphia, 1847."

"*Teeth—their Structure, Diseases and Treatment.* By John Burdell, Dentist. New York, 1847."

"*Remarks on the Proper Mode of Administering Sulphuric Ether*

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* Boston Medical and Surgical Journal.

by Inhalation. By William T. G. Morton. Boston, 1847." "The directions which it contains upon the subject are clearly expressed, and we doubt not, if they were always followed, its *liability* to produce dangerous effects would be very greatly lessened. It is dedicated to the Surgeons of the Massachusetts General Hospital." *

"*A Popular Treatise on the Teeth;* containing a history of the Dental Art, with anatomical descriptions of the Mouth and its appendages, and accounts of Chemical and Physiological Experiments on the Teeth. Also a full and accurate history of Ether or Letheon, for the Prevention of Pain, with directions for use. Designed for the use of families, and as a Manual for the student and practical dentist. Illustrated with numerous engravings; pp. 423. By Mayo G. Smith, Dental Surgeon. Boston, 1848." "It embodies considerable information . . . . but we fear it is too large for the non-professional reader, and is too deficient in detail for the dental student or practitioner." †

"*A Dictionary of Dental Science, Biography, Bibliography and Medical Terminology.* By Chapin A. Harris, M.D., D.D.S. Philadelphia, 1849." "Not only are all medical and surgical terms explained with concise clearness, but we have also a collection of valuable knowledge in all that relates to dental science, which we can find in no single work elsewhere. This dictionary will, among physicians and surgeons, successfully rival our best standard medical dictionaries; whilst among dentists it cannot fail to command a most unquestionable and decided preference, embodying, as it does, all that the others can teach, and much more on which they are silent." ‡ Later criticisms, and the popular verdict, do not appear to have indorsed the above eulogy. However, other editions of the work, amended and altered, have made it more valuable than in its first form.

"*The Medical Student's Guide in Extracting Teeth;* with numerous Cases in the Surgical branches of Dentistry. By S. S. Hornor, Practical Dentist. Philadelphia, 1851." "The author of the above work commences with a defence of the key instrument, which after 'all others fail,' seems to constitute the '*anchor*' of his 'hopes.' . . . . The directions for the removal of the other teeth, though perhaps not quite as objectionable, are, in our estimation, more or less faulty and imperfect." *

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* C. A. Harris, in American Journal of Dental Science, 1st Series, vol. viii. p. 96.

† American Journal of Dental Science, 1st Series, vol. viii. p. 307.

‡ Ibid., vol. ix. p. 301.

"*Ether and Chloroform:* Their employment in Surgery, Dentistry, Midwifery, Therapeutics, etc. By J. F. B. Flagg, M.D., Surgeon Dentist, etc. Philadelphia, 1851."

"*A Practical Treatise on Dental Medicine:* being a compendium of Medical Science as connected with the study of Dental Surgery. By Thos. E. Bond, A.M., M.D., etc. Philadelphia, 1851." "The work of Professor Bond opens a new era in the history of dental surgery. Pointing out, as it does, the pathological relationship between diseased teeth and other parts of the body, it demonstrates, in the fullest and most conclusive manner, the importance and absolute necessity of a thorough knowledge of *anatomy, physiology, pathology* and *therapeutics*, to the dentist." †

"*The Physiological Effects of Sulphuric Ether*, and its superiority to Chloroform." By Wm. T. G. Morton, M.D. New York, 1851."

"*A Text Book of Anatomy and Guide in Dissections*, for the use of students of Medicine and Dental Surgery. By W. R. Handy, M.D., etc. Philadelphia. 1853." "Dr. Handy not only studies every individual part in all the relations of its elements, but he also dwells particularly upon the relations, anatomical and physiological, of the part with neighboring organs and with the entire frame. Thus, a clear, connected, and natural system of teaching is arrived at, instead of the eminently artificial method commonly pursued. He begins with what he calls the *alphabet of anatomy*, that is, the primary tissues of the body. Having studied these, he commences with the mouth, and follows the physiological course of the food in his demonstration. The extremities, not having any direct relation to these functions, are described by themselves. We are satisfied that a student will learn more that is valuable from this method, than from any other with which we are acquainted." ‡

"*Chemistry and Metallurgy as applied to the Study and Practice of Dental Surgery.* By A. Snowden Piggot, M.D., etc. Philadelphia, 1853." "The work is divided into four books. The *first* is an outline of organic chemistry. It contains an account, first, of the ultimate, and then of the proximate elements of the body; taking up first the protein compounds, then the organic acids and bases in regular order. *Book second* contains an account of digestion, first in the stomach, and then in the intestines. It includes, of course, the chemistry of the gastric juice, the bile, the pancreatic fluid, the intestinal juice, the fæces and vomited matters. *Book third* contains the chemistry of the mouth. This includes the chemistry of saliva, healthy and morbid; the chemistry of the teeth, of mucus, and of salivary calculus, as far as known. *Book fourth* treats of the chemistry and metallurgy of metals and the earths used in the manufacture of porcelain teeth. It contains, first, an account of the various methods of applying heat, the construction of furnaces, crucibles, lutes, measurement of heat, and full tables of fuel, showing the economy of the different varieties. Secondly, the metals,—bestowing particular attention on gold and silver. Very full tables of coins of these two metals are given, so that the mechanical dentist can be perfectly sure of the exact composition of his alloy. Thirdly, the earths and alkalies, the structure of porcelain, the method of preparing the materials and the mode of making and coloring artificial teeth." *

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* American Journal of Dental Science, 2d Series, vol. i. p. 388.

† Ibid., p. 387.

‡ Ibid., vol. iv p. 163.

"*A Treatise on the Use of Adhesive Gold Foil.* By Robert Arthur, M.D., D.D.S. Philadelphia, 1857." "It not only gives the result of the experience of the author, but also explicit directions for the preparation and use of the gold. In the use of adhesive foil, an entirely different system of manipulation from that employed in filling teeth with ordinary foil is required, and as there are many cases in which a better operation can be made with gold of this description than with common foil, the present treatise cannot prove otherwise than very serviceable to the profession." †

"*A Practical Treatise on Operative Dentistry.* By J. Taft, Professor of Operative Dentistry in the Ohio College of Dental Surgery. Philadelphia, 1859." In the course of a very thorough review of this work,‡ Dr. J. H. McQuillen makes the following remarks: "It was with no little satisfaction that we noticed recently the announcement that Professor Taft was engaged upon the work that at present occupies our attention. Remembering his long experience as a practitioner, the advantage he enjoyed as public teacher in this department, and as contributor to and editor of one of our journals, we felt assured that a work coming from such a source could not but meet all the requirements of the novice and the inexperienced practitioner in this department. If, upon a careful perusal of the work, candor compels the confession that our expectations have not been entirely realized, we feel no hesitation in acknowledging that, on the whole, it is a valuable *résumé* of the practice that prevails with the profession in this country."

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* American Journal of Dental Science, 2d Series, vol. iv. p. 166.

† Ibid., vol. vii. p. 598.

‡ Dental Cosmos, vol. i. p. 194.

"*A Practical Treatise on Mechanical Dentistry.* By Joseph Richardson, D.D.S., M.D., etc. Philadelphia, 1860." "In the arrangement of the work the author has proceeded in an orderly and systematic manner, and his descriptions of the different articles employed in the dental laboratory and the various methods of manipulation in the construction of artificial dentures are given in a clear and comprehensive manner. Some of the plans advocated by the author are different from what we should advise, but we will not pretend to say that his course may not be the best. Embracing, as the work does, all the prominent points connected with mechanical dentistry, ... we gladly recommend it as a useful and valuable treatise, particularly to those (students) for whom it was particularly prepared." *

"*Dental Anomalies*, and their influence upon the production of diseases of the Maxillary Bones. By Am. Forget, M.D., C.L.D., etc. Philadelphia, 1860." "It consists of two chapters. The first treats of 'Anomalies of Nutrition and Development.' Cases are given, the first of which is very minute in all its parts; the *history of the disease*, the *condition* of the patient, the *diagnosis* of the disease, the *operation*, the *method of its performance*, with *remarks on the same*, the *consequences of the operation*, the *final results of the operation*, with *reflections*. Other cases are also given, which, taken together and closely examined, afford a large amount of information. Chapter second treats of anomalies of positions of the teeth, and their pathological consequences. This part is also illustrated with cases of much interest." †

"*Dentition and its Derangements.* By A. Jacobi, M.D. New York, 1862."

"*A Manual on Extracting Teeth.* By Abraham Robertson, D.D.S., M.D. Philadelphia, 1863." "This work, 'founded on the anatomy of the parts involved in the operation; the kinds, and proper construction of the instruments to be used; the accidents liable to occur from the operation, and the proper remedies to retrieve such accidents,' is the only monograph of any note upon the subject. . . . Though we would differ in some respects from the author, we regard it as a very excellent work."*

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* Dental Cosmos, vol. ii. p. 281.

† Dental Register of the West, vol. xiv. p. 61.

"*Instructions in the Manipulation of Hard Rubber or Vulcanite for Dental Purposes.* By E. Wildman, M.D., D.D.S. Philadelphia, 1865."

"*Some Suggestions Concerning the Nature and Treatment of Decay of the Teeth.* By Robert Arthur, M.D., D.D.S. Baltimore, 1867."

"*Odontalgia, commonly called Tooth-ache,*—Its Causes, Prevention, and Cure. By S. Parsons Shaw. Philadelphia, 1868."

"*Dental Materia Medica.* Compiled by James W. White, M.D. Philadelphia, 1868." "It fills a long-felt void in dental literature. . . . . The entire book gives evidence of special care in its preparation; and the information derived from it can be generally, and perhaps universally relied on."†

"*Register Papers; A Collection of Chemical Essays in Reference to Dental Surgery.* By Geo. Watt, M.D., D.D.S., etc. Philadelphia, 1868." "As the title of this work indicates, it consists of a series of essays prepared for and originally published in the *Dental Register of the West.* Making as the majority of the papers do direct and practical application of chemistry to the needs of the dental practitioner, they cannot but prove of advantage to the profession. . . . Among them, and without detracting from the merit of others, attention may be directed in particular to 'The Action of Topical Remedies' as an ably-written article, imparting valuable information in a direction of such importance, that this essay alone should be sufficient to secure an extensive demand for the book on the part of the members of the profession."‡

"*A Treatise on the Diseases and Surgery of the Mouth, Jaws, and Associate Parts.* By Jas. E. Garretson, M.D., D.D.S., etc., etc. Philadelphia, 1869." In concluding an extended review of the above work,§ Dr. McQuillen says, "In the limited space granted for a review, it is impossible to do more than mention the subjects treated, and state that the author, taking advantage of the recorded experience of eminent surgeons, combined with his own personal experience in this direction, presents not only the general principles to govern the practitioner in the performance of the necessary operations, but also a large number of cases which have been under his own care and that of other surgeons. A diversity of opinion may exist on the part of dental practitioners relative to extending their field of practice by engaging in the performance of surgical operations. There can, however, be but one opinion relative to the importance and necessity of the dentist being thoroughly informed on such subjects. No work has been prepared heretofore to meet their needs; and this one is so well done that it is warmly commended to the dental student and practitioner as a useful text-book to the former and an invaluable work of reference to the latter."

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* Dental Register of the West, vol. xxii. p. 399.

† Ibid., p. 398.

‡ Dental Cosmos, vol. x. p. 38.

§ Ibid., vol. xi. p. 648.

This work, even before its completion,* was adopted as a text-book by several of the dental colleges.

"*Treatment and Prevention of Decay of the Teeth.* A practical and Popular Treatise. By Robert Arthur, M.D., D.D.S. Philadelphia, 1871." "The difference between the methods in general favor and those which the author commends, is radical, and if adopted will revolutionize the treatment of proximal surfaces of the teeth. . . . In the preface the author claims as an inevitable conclusion that the methods at present relied upon for the prevention or arrest of decay of the teeth are either inadequate or imperfectly employed. . . . In the third chapter the 'treatment of decay' is considered. Plugging with gold or with any other material, it is contended, is not the only or the best method of arresting caries, though generally so considered. . . . Arguing from the fact that close contact of the teeth leads to caries of the proximate surfaces, and that teeth standing separate from each other are not, as a general rule, attacked, the inference is drawn that a like exception can be secured by artificial separation. This, then, is the method of treating caries, which the author proceeds to explain in detail."†

"*Studies in the Facial Region.* By Harrison Allen, M.D., etc. Philadelphia, 1874." "The volume is unique, because of the effort to embrace in small compass a consideration of the anatomy, physiology, and pathology of the facial region with the localization of diseased action, thus grouping together facts which otherwise would have to be sought for throughout many volumes."‡

With the above is concluded the list of works connected with the dental specialty which have been either written by American dentists or published originally in this country. Up to the year 1840 there have been included what are generally known as "popular treatises," but none since that date; the reason is, that the works of that character published before that time approached much more nearly, in kind and practical value, to those then considered professional works, than have the later popular essays assimilated to the later strictly professional publications; the former class of works having been, during later years, simply advertisements, in scope and effect if not in design; whereas those of times long past were often very superior, in character and scientific value,—witness L. S. Parmly's "Practical Guide" (1819), Josiah F. Flagg's "Family Dentist" (1822), and Shearjashub Spooner's "Guide to Sound Teeth" (1836).

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* See Acknowledgment, page 7 of the work.

† Dental C[illegible] iii. p. 591.

‡ Ibid., vol. xvii. p. 20.

PERIODICALS.

"*The American Journal of Dental Science.*" This, the first dental periodical in this or in any country, was issued on the first of June, 1839. "The circular of the publishing committee, E. Parmly, E. Baker, and Solyman Brown, sent it forth with many apparent misgivings as to the success of the experiment, and appealed in strong terms to the more intelligent members of the profession, to come forward to its support. . . . The journal was to consist of forty-eight pages, twenty-four of which were to be devoted to the republication of standard works on dental theory and practice. It was to be issued monthly. The need of such a publication was evinced by the promptness with which this effort was encouraged. In the fourth number a list of subscribers, embracing the most eminent names in the profession, was published, showing that there were at that time one hundred and seventy-four subscribers taking five hundred and eleven copies. This may seem a small number, but when it is recollected that this was years ago, when the number of intelligent reading dental surgeons was very small, it must be regarded as evidence of a remarkably general interest in the undertaking. During the first year of its publication the Journal was conducted under the editorial charge of E. Parmly of New York, and C. A. Harris of Baltimore, in which (latter) city it was printed. It was issued with some irregularity, at the subscription price of three dollars per annum. At the close of the year it came into the possession of the American Society of Dental Surgeons, which at that time was organized. The title was then changed to that of the 'American Journal and Library of Dental Science.' It was now issued in quarterly numbers, and the subscription price was increased to five dollars. It was placed by the Society in the charge of C. A. Harris of Baltimore, and Solyman

Brown of New York. The editors were to be assisted in their labors by twenty collaborators, whose duty it was to furnish matter for the work and to aid its circulation. From that period until August, 1850, the Journal continued to be issued under the auspices of the Society, under the charge of several editors, appointed yearly. At the annual meeting, in that year, it was transferred to Dr. C. A. Harris, of Baltimore, the Society relinquishing all control of the Journal, which is now a private enterprise."*

During the period of republication of standard works in this periodical, the following were issued, given in the order of their appearance:

The Natural History of the Human Teeth, etc. By John Hunter, F.R.S., etc. With notes by Eleazer Parmly.

A Practical Treatise on the Diseases of the Teeth. By John Hunter, F.R.S., etc.

Dentalogia: A Poem on the Diseases of the Teeth and their Proper Remedies. By Solyman Brown, A.M. With notes by Eleazer Parmly, Dentist.

A Treatise on First Dentition and the frequently Serious Disorders which depend upon it. By M. Baumes. Translated from the French by Thomas E. Bond, Jr., M.D.

Principles of Dental Surgery, etc. By Leonard Koecker, M.D., etc.

Researches on the Development, Structure, and Diesases of the Teeth. By Alexander Nasmyth, F.L.S., F.G.S., etc.

A Treatise on the Diseases of the Mouth. By J. B. Gariot, M.D. Translated from the French by J. B. Savier, D.D.S. With notes by the Editors of the *American Journal of Dental Science.*

A Treatise on the Disorders and Deformities of the Teeth and Gums, etc. By Thomas Berdmore, M.C.S., etc.

A Treatise on the Anatomy and Physiology of the Teeth, etc. By David Wemyss Jobson, M.R.C.S.E., etc.

A New Treatise on the Theory and Practice of Dental Surgery. By J. Lefoulon, Surgeon-Dentist. Translated from the French by Thomas E. Bond, Jr., M.D., A.M.

Anatomy of the Dental System, Human and Comparative. By Ph. Fr. Blandin. Translated from the French by Robert Arthur, D.D.S.

A Treatise on Second Dentition, etc. By C. F. Delabarre, M.D., etc. Translated from the French by (anonymous, but supposed to be) Dr. Chapin A. Harris.

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* American Journal of Dental Science, 2d Series, vol. ii. p. 52.

A Critical Inquiry into a few Facts connected with the Teeth. By George Waite, Esq., Surgeon-Dentist, etc.

Complete Elements of the Science and Art of the Dentist. By M. Desirabode, assisted by his sons, etc. Translated from the French by (anonymous, but supposed to be) Dr. Harris.

An Essay on the Structure and Formation of the Teeth in Man and Various Animals. By Robert Blake, M.D. Revised and corrected. With notes by C. O. Cone, D.D.S.

The Youth's Dentist, etc. By J. R. Duval, Dentist, etc. Translated from the French by J. Atkinson, Surgeon-Dentist, M.R.C.S.E., etc.

A Treatise on the Diseases and Surgical Operations of the Mouth and Parts Adjacent, etc. By M. Jourdain, Dentist, etc. Translated from the French, by (anonymous, but supposed to have been) P. H. Austen, M.D.

A Practical Treatise on Dental Medicine, etc. By Thomas E. Bond, A.M., M.D., etc.*

The method of publication adopted for this journal is somewhat singular, and productive of inconvenience in the matter of reference. The first ten volumes constitute the "first series," the second ten volumes the "second series," and the remainder, so far as issued, make a "third series," each series being numbered in volumes from one onward, as though a separate publication. The *Journal* is still in active existence, being now edited by F. J. S. Gorgas, M.D., of Baltimore.

Stockton's Dental Intelligencer was the second dental periodical in existence. It was commenced about November, 1844, being published and edited by S. W. Stockton & Co., of a dental depot in Philadelphia, and also in London, England, where Mr. James Robinson, Surgeon-Dentist to the Metropolitan Hospital, was its editor. It was issued in pamphlet form, in monthly numbers, but how long it continued to be published has not been determined. We are in possession of a copy dated October, 1847; and Dr. Arthur, in 1851, stated † that the *Intelligencer* was not then in existence; therefore it is evident that its publication was discontinued between those dates.

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* Dr. Arthur, in his essay on the History of Dental Literature (American Journal of Dental Science, 2d Series, vol. ii. p. 43), gives a list of the republications of the Journal, which is both incomplete and incorrect. The above enumeration is believed to be correct, being taken from the library of the late Dr. A. Westcott, who was one of the editors of the Journal.

† American Journal of Dental Science, 2d Series, vol. ii. p. 58.

also issued monthly. In 1861, Dr. S. S. White became sole proprietor. In 1865, Dr. J. D. White ceased his editorship, Drs. McQuillen and Ziegler continuing. In 1872, James W. White, M.D., D.D.S., assumed the editorial charge, in which position he still remains.

This journal has probably a wider circulation than any other dental periodical has ever attained. It is, indeed, sufficiently well known to render further reference to it quite unnecessary.

The Dental Times and Advertiser was begun in 1851, in Baltimore, as a quarterly, under the editorship of Alfred A. Blandy, M.D., D.D.S. Particulars as to its further existence have not been obtained.

The Dental Expositor was started in New York, as a semi-annual quarto, by Solyman Brown, A.M., M.D. The design was unique. The first number contained "the editor's well-known didactic poem, 'Dentalogia,' in five cantos, as originally published by Dr. E. Parmly for private distribution among his friends."[*] The second number contained "Dental Hygeia," another poem, also by Dr. Brown. The third commenced the republication of Dr. Brown's treatise on "Mechanical Dentistry," which originally appeared as a series of articles contributed to the *American Journal of Dental Science*.[†]

It is believed that but three numbers were issued; at least, no information as to any others has been received.

Brown's Dental Advertiser was issued in Cincinnati, in 1854, as a quarterly. It was owned and edited by J. M. Brown, also the proprietor of a dental depot. Further particulars in its regard have not been obtained.

The Dental Monitor was a quarterly issued in New York City in 1854, by J. G. Ambler, M.D., D.D.S., and intended for the general reader more than for the professional one.

The Dental Obturator was begun in New Orleans, May, 1855, published quarterly, and edited by John S. Clarke, D.D.S. It did not enjoy a long existence.

The Forcep was the title (as printed) of a monthly publication issued in New York City in 1855, by the New York Teeth Manufacturing Company. How long it existed is not known.

The American Dental Review was begun at St. Louis about 1857–8, and published quarterly by the editor and proprietor, Dr. A. M. Leslie.

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[*] Dental Register of the West, vol. v. p. 252.

[†] First Series, vol. ii. pp. 161, 231, 265; vol. iii. pp. 81, 189, 233.

The Dental Reporter was first issued in Cincinnati in April, 1858, as a quarterly, by John T. Toland. It was discontinued in 1859, as before noted, in consequence of Mr. Toland becoming the owner of the *Dental Register of the West*.

The New York Dental Journal and Reporter was issued in New York City, July, 1858, under the editorship of Drs. Geo. H. Perine and Frank H. Norton. In 1860, the name of the publication was changed to *The New York Dental Journal*, and Dr. Perine became disconnected with it, W. B. Roberts assuming the proprietorship, and Frank H. Norton continuing in the editorial chair. The manner of publication of this journal, or the date of its cessation, has not been obtained. It was in existence in 1864.

The Cincinnati Dental Lamp was begun in that city in November, 1858, with Dr. J. M. Brown as editor and proprietor. The time of its demise has not been obtained.

The Dental Enterprise was a monthly journal, first issued about 1859, in Baltimore, by Henry Snowden. It is not now in existence.

The Southern Dental Examiner was started in Atlanta, Ga., in May, 1860, and issued monthly under the editorship of Dr. J. P. H. Brown. It is believed to have been discontinued within a short time thereafter.

The Vulcanite was first published in May, 1860, in New York City, and regularly appeared for some time, as a quarterly. It was published by the American Hard Rubber Company, and devoted to the interests of the dental branch of that business, under the editorship of B. W. Franklin.

The Dental Quarterly was begun March, 1862, in Philadelphia, and published as a quarterly by Johnson & Lund of that city, the editors being Dr. Ambler Tees and F. N. Johnson.

The People's Dental Journal was issued in Chicago, January, 1863, and edited at first by W. W. Allport, D.D.S., and S. T. Creighton, and subsequently by Drs. Allport, A. Hill, D.D.S., and J. Richardson, D.D.S. Its periods of issue have not been obtained.

The Dental Times was begun, July, 1863, in Philadelphia, as a quarterly, edited and published by the Faculty of the Pennsylvania College of Dental Surgery. It continued to be issued, certainly until 187[illegible], and how long thereafter is not known to us. It is not in existence.

Dental Chronicle and Examiner was the title of a quarterly publication in Albany, New York; commenced January 1st, 1865, and edited and published by B. Wood, M.D., in the interests of his plastic filling material. It is long since out of existence.

The Missouri Dental Journal was first issued in January, 1869, in St. Louis. The first editors were Homer Judd, M.D., D.D.S., Henry S. Chase, M.D., D.D.S., and W. H. Eames, D.D.S. The present editor is Dr. Henry S. Chase. It is published monthly.

The Dental Advertiser was begun in May, 1869, in Buffalo, New York, by the Buffalo Dental Manufacturing Company. It is still issued quarterly.

The Dental Mirror was the title of a small pamphlet published monthly in St. Louis, beginning January, 1872, by the St. Louis Dental Society. It was probably (if we may judge from the character of its contents) intended for distribution to the patients of the Society's members.

The Pennsylvania Journal of Dental Science was begun January, 1874, in Lancaster, Pa., by Samuel Welchens, D.D.S., by whom it is still edited. It appears monthly.

Johnston's Dental Miscellany was begun in New York City, January, 1874, and issued monthly from Johnston Brothers' dental depot, by whom it continues to be published.

The Dental Science and Quarterly Art Journal was the name of a periodical started in New York City, February, 1875, under the editorship of A. P. Merrill. It was intended for the general reader. It is believed to have been discontinued.

DENTAL EDUCATION.

THE history of the progress of dental education in this country may be divided into four epochs: 1. The methods in vogue from 1780 to 1840. 2. The causes leading to the establishment of dental schools, and the contemporary opinions thereon. 3. The results of such establishment. 4. The present movement toward a higher standard of qualifications of the dental practitioner than has yet been held.

In treating of the subject, the above progression will be regarded; though the exactness of the noted divisions will not be attempted, and no original interpretation of them will be made. It is thought that more of interest and value will attach to a retrospective statement of the ideas of prominent dentists, as published from time to time, than to any presentation of original views on the matter. Accordingly, this chapter will be mainly a compilation from professional literature, arranged, generally, chronologically, and with only such individual comment as will be necessary to make a connected narrative.

The earlier existence of the dental specialty in this country presents an aspect almost exactly similar to that of the beginning of any science. The necessity for skilled attention to oral diseases was, of course, apparent; and hence arose the demand for it,—which, from the very nature of the case, it was impossible at once to supply; since a science, the rudiments of which are unknown, cannot command even primary teachers, much less final proficients, in its practical applications. Thus it came that the great majority of early dentists were entirely empiric; and hence, also, the secrecy regarding processes, and the professional conservatism displayed during the first decades of the existence of American dentistry. Dr. E. Townsend, in an address delivered before the Society of the Alumni of the Baltimore College of Dental Surgery,* (1850) said as follows:

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* American Journal of Dental Science, 1st Series, vol. x. p. 180.

"The *science* of Dental Surgery, properly so called, is scarcely older than the oldest man in this assembly, and in this country it is almost as young as the youngest of its mature practitioners. Its origin, moreover, is not only a very recent, but it is also a very humble one. . . . Twenty years ago dentistry was practiced as a secret art; its disciples evinced great exclusiveness, and carefully hid from each other the methods by which they attained, or thought they attained, any individual superiority. The profession was not then a fraternity; it had not the character of a liberal art; it had all the meagreness of a selfish individualism; its spirit was narrow and exclusive, and full of arrogance and pretence, and, while it thus encouraged all that is illiberal in rivalry, it hindered whatever is useful and noble in generous emulation. But this was not an essential or intrinsic meanness of the profession, it was the fault of its ignorance and inexperience; in a word, a fault inseparable from its infancy. The earlier history of every branch of the healing art confesses similar blemishes, and all alike justly rest their present claims upon their present character."

From about 1785 to about 1830, the method of dental practice was largely—and at first almost entirely—itinerant. Permanent locations were effected only in the larger seaboard cities, as Boston, New York, Philadelphia, and Baltimore. The following is an extract from a letter of Dr. E. Parmly to Dr. J. Brockway, Sr.:* "I met (1817) with no person who even called himself 'dentist' from Philadelphia to New Orleans, and I practiced in the principal towns going west between the two places." Dr. J. Brockway, himself, practiced about 1822 in Newbury, Vermont; and records the fact† that he was then "the only dentist known from Canada to Albany, and from the Rocky to the White Mountains." The very word "dentist" was not known to many. Dr. Blakesly relates an incident in point, occurring as late as 1834. He went into the country, from Utica, N. Y., to attend the daughter of a deaf old farmer, and was amused to hear, through a thin wall, the announcement of his advent to the farmer, who insisted upon understanding *dentist* to be *tempest*, and finally desired to know what a dentist was.‡

It is thus apparent that dental instruction of a good character was not easy to be obtained. Only those permanently located were in a position to give it, and then only at considerable expense of time, labor, and money. The class of practitioners at all capable of giving instruction "was necessarily very small. Men engaged in a lucrative practice, operating during the day, and doing goldsmiths' work at night, could not devote much time to the instruction of pupils. Besides, the advantage of a certificate of pupilship from one of the highly reputed dentists was so great, that very large fees were paid for such tuition, imperfect as it was. Five hundred dollars was commonly asked for the office fee of a student, and of course, very few could avail themselves of such dearly-purchased privileges."*

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* Lecture before the Third District Dental Society of New York, 1869, by Dr. Brockway, page 5.

† Loc. cit., p. 6.

‡ Manuscript of Dr. S. B. Palmer.

"Mr. Parmly, being desirous that his peculiar treatment of the teeth, his operations and general views of the subject, should become as widely diffused as possible, for the common benefit of society, undertakes to qualify gentlemen of liberal education for practice, as dentists, on the following terms: For practice in London, $1000. In any other city of Great Britain or America, $700. For foreign practice, $500." †

The last quotation must not be regarded as savoring of quackery, at least so far as its advertising character is concerned. The dental ethics of the day did not exclude advertising as unprofessional. This method of obtaining celebrity was resorted to by the very best men in dentistry, without fear of professional censure. It is even recorded of one dentist,‡ as a matter worthy of note, that he did not advertise himself.

The character of the dental profession, the methods of obtaining education in the specialty, and its general progress up to 1835, are well shown in an essay by Dr. C. W. Ballard, of New York, from which the following extracts are made :§

"Owing to the absence of American dental literature, and the scarcity and expense of that published in Europe, it became a matter of necessity that those who, at this time, studied in the United States, should be in many of the more scientific points relating to the profession, most sadly deficient. This was a difficulty in the way of dental education, which could be overcome only by rendering dental works more plenty, a thing more easily talked about than accomplished, as is evident from the fact that though the evil was known and felt, it was some years before the remedy was commenced, and many more had elapsed before it could be said to be fairly under weigh. During this time the number of dentists practicing in different parts of the country was fast increasing; by the year 1825, they numbered a little over two hundred; (*)—of these . . . . the majority had commenced practicing without any claim upon the public beyond that of having purchased a few secrets from such as possessed them, and were willing to sell, depending upon these secrets, and their own ingenuity and boldness, to help them into practice and out of difficulties.

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* American Journal of Dental Science, 2d Series, vol. ii. p. 98.

† Lectures on the Natural History of the Teeth, by L. S. Parmly, London, 1820, p. 99.

‡ Dr. John Randall, of Boston. See Harris's Dictionary of Dental Science, edition of 1849, p. 638.

§ American Journal of Dental Science, vol. ii. p. 59.

"As late as the year 1830, the means of obtaining information upon such subjects as related to dental surgery, were extremely limited. It is true books were beginning to be published, but they were mostly small, popular works, and generally added more to the reputation of the authors than to the available literature of the profession. They were, however, productive of much good, by drawing the attention of the public to the importance of preserving the teeth.

"In all of our large cities were to be found some few men who, having possessed themselves of what might be called the theory of dental science, had put it in practice, and by much energy, perseverance, and skill, were enabled to add greatly to the information which had been imparted to them by their instructors. These men became teachers in their turn, but like those who had trodden the ground before them, their time and skill were needed and demanded by their patients, and the number of students to whom they could give *proper attention* was by far too small to supply the demand for dentists, and a host of pretenders rushed in to supply the deficiency. Dental surgery may with truth be said to have been at this time at its lowest ebb.

"The various methods in vogue, at this time, of obtaining a knowledge of the profession, or of founding claims upon the public as dental surgeons, may, together with the dentists thus constituted, be set down in three distinct classes.

"Class *first* consisted of those whose ignorance was their only excuse for the injuries they inflicted upon their patients, and ultimately their profession, as also of those who, having purchased or traded for a secret or two, depended upon bold-faced and unblushing impudence for their success. . . . Such men could only stand high in their own estimation by dragging the profession down to their level. . . . Dentists, to this day, suffer to some extent from the odium brought upon their calling by the acts of these men. Dentists of this class knew little and cared less about the duties devolving upon them, and yet they were always ready to receive pupils and instruct them in the *secrets* and *mysteries* of dental science, provided they were well paid for it. The fees exacted in these cases varied from five dollars to one thousand. . . . The length of time occupied by these initiatory proceedings depended very much upon the ability of the student and the ignorance of the teacher. It was generally conceded by these dentists, that the shorter the time wasted in this manner the better for all parties.

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* In 1830 there were, in Cincinnati, only four dentists. In 1848 this number had increased to forty-two. In the latter year, in Boston, there were seventy dentists. "Lowell, Worcester, Springfield and many other large towns (in Massachusetts, in 1848) have each from five to ten practicing dentists." New York Dental Recorder, vol. ii. p. 234. See Table of Dental Census, for 1850, '60, and '70," at the end of this chapter.

"The *second* class may be considered as consisting of those dentists who, having obtained as great a knowledge of the principles and practice of dental surgery as their time, means, or opportunities would allow, came at once to the conclusion that so long as they did the best they knew how for their patients, and comported themselves in other respects as became good citizens, they had done their whole duty. . . . With these may be included those who commenced practice with little or no education, and were compelled, in order to compete with those around them, to add, by every means in their power, to the knowledge and experience that their practice was daily giving them. Many of these men eventually became, to a certain extent, good practitioners; but of the best of them it would be difficult to say whether the good or the evil which they had done in their day preponderated. Dentists of the second class were much better acquainted with their professional duties than those first described; and very many of them excelled in that branch of the practice known as mechanical dentistry; and, in justice to them, it must be borne in mind that, at the time of which we are writing, mechanical dentistry was considered, by a majority of the profession, to be by far the most important part of dental practice. . . .

"Dentists of the *third* class, although numerically less than either of the other classes, had, as a result of their course of practice and deportment generally, acquired far more reputation and influence. . . . . These few men seemed, from the outset, to have been impressed with the belief that the resources of the science were by no means developed—that dental surgery held a position far beneath that to which it was entitled— . . . . and that, as all these evils could and should be remedied, it was their duty to devote a portion of their time and energies to the work.* Unquestionably, the first step they could take was to improve themselves; to become thoroughly acquainted with dental surgery as it was then practiced in this country and in Europe; to carefully sift the good from the bad; to give truths a more prominent position, and to expunge all errors. This required years to accomplish. . . . The next thing to be done, was to make the profession acquainted with the results of their labors. Consequently, dental literature of an improved character began to make its appearance.

"This change at once advanced the profession. Many of the dealers in secrets lost immediately a most important part of their traffic; they soon had very few secrets to sell, and a still smaller number of purchasers. Consequently they were obliged either to give up wholly the practice of dentistry, or to confine their attention to it to a degree such as nothing short of a prospect of losing their means of support could ever have compelled them. This was a great gain of itself; but much more was to be done. The few had presented to the profession their many facts; but a vast amount of valuable information was still treasured up by those who, from their ingenuity or experience, had become possessed of it. Every practitioner of standing had some theory or fact proper to add to the general fund."

This graphic narrative of Dr. Ballard's brings the subject up to the time of the first great change in dentistry,—the revolution in the comparative importance of the two great branches, operative and mechanical. Hitherto the latter had held much the more advanced position. Inventive genius and mechanical ingenuity had far outstripped theory,—so far, that they were compelled to pause until their slower compeer should afford them a base for further excursions. Thus dentists had time (and occasion) to review the past, from which to gather new facts for the future; and the most prominent ways to improvement appeared in two directions:—one, a more liberal and thorough interchange of opinion and experience,—the other, an advanced ground for the theory of practice.

The first of these appears to have been met, for the time, by the establishment of the *American Journal of Dental Science*, in 1839. Though somewhat late, this journal appeared before men eager to receive and impart, through its pages, that which they could give or were desirous of obtaining. Books, too, began to be more circulated and read than formerly. These, though mostly popular treatises, as Dr. Ballard remarks, were entitled to considerably more credit as professional educators than he gives them. They were written much more nearly up to the standard of the best professional practice and theories of the day, than are works of the same class at present; and were, it is safe to say, read quite as much by dentists as by that public for which they were professedly intended.

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* Dr. Ballard gives the relative proportions of these three classes as, one-half for the first, three-eighths for the second, and one-eighth for the third.

The second desideratum was almost immediately met and filled, by that (to many) new idea of prevention of disease which was destined so completely to revolutionize the dental theory and practice. It was not new, however, to all. As far back as 1800, Hudson and Gardette had strenuously advocated it; and had been joined very soon by many of those whose names are now historic almost entirely from their connection with the subject.

These considerations awakened to active vitality energies which had long lain dormant. Nothing so prompts to effort as appreciation. Men like Hayden, Harris, Spooner, and others could now work with bright hopes of success, to elevate the profession; and work they did.

The great needs lay, again, in two directions: facilities for teaching the truths already evolved, and associated effort. Dentistry was expanding too rapidly to depend longer on the isolated and private tuition of its disciples. On this subject Dr. C. A. Harris said,* "We should furnish the necessary facilities for those who may design practicing the art, to qualify themselves properly for its duties. Dentistry should be as much a matter of public instruction as medicine or surgery; and to me it has been a matter of much surprise, that the efforts of the better informed of the profession have not been directed to the establishment of an institution for this purpose. An institution of this kind would not only redound to the credit of the whole profession, but it would be instrumental of much general good. Its influence could not be otherwise than salutary, as it would have a tendency to drive from the ranks of the profession ignorant pretenders, and substitute in their places men that would be qualified to practice with credit to themselves, and to the benefit of their patients. Men of genius and education would be more frequently induced to enter it, for then none except competent persons would be recognized as its members. That a college for the education of persons for the profession might be gotten up, and that it would be well sustained, I think is more than probable, for if a school of this kind was in operation, it would be expected of dental practitioners that they should be educated in it, or, at least, those who should subsequently enter the profession. The same object might be accomplished by the establishing of professorships of dentistry in the medical schools. All the branches necessary to a dental education might be taught; and should the profession not be disposed to establish a school for their own exclusive benefit, it is to be hoped the importance of the subject may be soon so felt as to induce the medical institutions of the country to take it up, and furnish the necessary facilities for the obtaining of as thorough an education in this as in their own immediate profession."

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* American Journal of Dental Science, 1st Series, vol. i. p. 57.

And again, in his opening address to the first class of the Baltimore Dental College,* "Of the qualifications necessary to be possessed by a dental practitioner, and the time required for their acquisition, few seem to be aware. On this subject an erroneous opinion seems pretty generally to prevail. A little mechanical tact, or dexterity, is thought by some to be all that is requisite to a practitioner of dental surgery, and that this could be obtained in, at most, a few weeks. The prevalence of this belief has given countenance to the assumption of the profession by individuals totally disqualified to take upon themselves the exercise of its complicated and difficult duties. But it is to be hoped that the day is not remote when it will be required of those to whom this department of surgery shall be entrusted, to be educated men, and well instructed in its theoretical and practical principles.

"Elevate the standard of the qualifications of the dental surgeon to a level with those of the medical practitioner, and the results of his practice will always be beneficial, which at present are frequently the reverse. Require of the practitioner of dental surgery to be educated in the collateral sciences of anatomy and physiology, surgery, pathology, and therapeutics, and the sphere of his usefulness and his respectability will be increased. Require of him to be thus qualified, and he will be able to contribute to the advancement and dignity of his calling, and by a zealous devotion to it he will soon arrive at an excellence to which heretofore but few, comparatively, have attained, and enjoy the high gratification of knowing that he is a benefactor of his fellows."

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* American Journal of Dental Science, 1st Series, vol. i. p. 199.

Under the spur of such ideas as these was instituted the Baltimore College of Dental Surgery. Regarded at first as only an experiment, great anxiety was felt by its projectors lest, through any false position taken, they should endanger its success. But so confident were they of the correctness of their own views of the necessities of dental education that they took ground so advanced as not only to be beyond the experience of fifty years, but also to cause many fears among others as to the permanency of the institution. "Conscious that its claims to respectability and usefulness will depend upon the manner in which they shall discharge their duties, it will be their constant endeavor to impart not only correct but thorough theoretical and practical information; persuaded that without this it is impossible for any to practice the art with credit to themselves or benefit to their employers, they are resolved to admit none to the honors of the institution except such as possess it. In short, they are determined that no reproach shall rest upon them for fixing a standard of qualification that shall not at once be respectable, and entitle those coming up to it to the confidence of an enlightened community."*

The establishment of a dental school provided, in a measure, and in principle, for the future of the profession; but other agents were needed for its immediate relief from the crowds of errors which besieged it. Associated effort, as has been seen, was the measure proposed for this purpose; and the organization of the American Society of Dental Surgeons, and, shortly afterward, of other associations, proved eminently successful in this direction.

These great changes—for the better—in dentistry, occurring in such rapid succession, and at once compelling such radical improvement as they did, are remarkable. It is believed that in the history of no other profession can such a great single stride forward be evidenced. So thoroughly were the projectors of these revolutionary agents satisfied with their success, that they, as it were, breathed the sigh of gratified ambition, and, strange to say, fell back into a supine position. The work of further advance seems to have been not for them. Newer, and hitherto quiet, agents, filled the van of progress. It is true that the originators of the successful enterprises were, at the moment of their triumph, already old men, and becoming fast unfitted for energetic effort.

And now began to appear a list of names before publicly unknown, some of whom carried the ideas evolved by their seniors to an extent beyond any the latter had held. But a few years after the establishment of dental schools,—even while those institutions were yet in their nonage,—it was held that the system of a separate degree for dental practitioners was radically wrong. The Rev. B. P. Aydelott, President of the Board of Trustees of the Ohio College of Dentistry, at its opening in 1845, made use of the following remarks: "We believe that the rightful position of the dentist is not generally understood, and, consequently, his character not duly appreciated by the public. Even his fellow-laborers do not, in this respect, always do him justice. His must be regarded as one branch of the healing art. He is therefore a medical practitioner. This is exactly his position ; to this rank, and nothing less, is he most rightfully entitled. . . . . Permit us here, briefly, to point out one good consequence which will be likely to result to the science and practice of dentistry, when every dentist regards himself, and is regarded by the public, as a member of the medical profession. He must in this case see more clearly the propriety and importance of going through a full course of medical study. . . . In this way only can he discern and duly appreciate the multitudinous and powerful, and often subtle, influences, as cause and effect between the diseases with which he has to do, and those affecting the whole or other parts of the system. . . . . When dentists generally are thus qualified, they cannot fail to assume their rightful rank, as professional men, before the public."*

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* American Journal of Dental Science, 1st Series, vol. i. p. 209.

Some went even further, and denounced the dental college as founded on erroneous theory, and ineffectual in practice. Said Dr. John Trenor, in 1851,† "Under the plea of remedying all these evils, what are termed dental colleges have been recently brought into existence. Conscious of the wants in this branch of the medical profession, and of the obvious inefficiency of a large number of those who appear in the capacity of its practitioners, and a belief taken, if not altogether for granted, certainly without sufficient investigation, that these institutions must necessarily remedy the deficiencies so generally felt and justly complained of, some of the members of the medical profession have accorded to them a degree of countenance and approbation to which it can be easily shown that they are by no means entitled. They come before the public with such confident promises and plausible pretensions, and, as at present constituted, are so decidedly inefficient, that they are a greater drawback to improvement than if they had never existed. They profess to remedy an evil which they most effectually and glaringly magnify. They hold out the idea of giving a complete and finished course of instruction on dentistry, while full two-thirds of what should be taught, and that the most important, too, viz., all the instruction which every medical school inculcates in medicine and surgery, it does not enter into their arrangements, nor do they possess the ability, with any degree of usefulness or benefit, to perform."

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* American Journal of Dental Science, 1st Series, vol. vi. p. 187.

† Remarks and Recommendations on the Professional Education of Dentists. Pamphlet, New York.

Such sweeping denunciation as this, from its very nature, was susceptible of instant and easy refutation; for whatever errors were existent in the plan of the dental college or had crept into its management, they were certainly not of so gross a nature as to merit such charges. But it was not so easy to refute other arguments advanced in opposition to the system, or to stop the growth of a similar feeling which was beginning to be apparent,—the desire for recognition, as professional equals, from the members of the parent branch, general medicine. However incorrect in principle this desire may have been, it still actuated many members of the dental calling. They began to devise means of affiliating, or in some manner connecting, the two branches; forgetting that the surest and speediest way of effecting their purpose was to educate themselves to a level, scientifically, with the others.

But the clearer minds in the profession saw the error, and avoided it by advocating a higher grade of scientific education than the dental colleges were manifestly evolving. The retrogression of these institutions from the expressed aspirations and intentions of their founders, was in no manner more clearly shown than by the increasing importance which began to be attached to the more mechanical operations and manipulations over the practical application of the great idea of Hudson,—that of the prevention of disease rather than its cure. Long before, in 1841, Dr. Hayden had said that "mechanical and operative dentistry" was "not, in strictness, the indispensable requisite qualification of a dental surgeon," while acknowledging that "it constitutes an essential part of the profession, as it has hitherto been, and as it is at present generally practiced." Further, in response to the question, "What rank ought we to, or shall we, assume?" he answered, "Although not hitherto recognized as being entitled to a niche in the temple of Esculapius, we assume the title and claim the rights and privileges of being the studious, diligent, and successful cultivators of at least a branch of that important, noble, and only divinely-sanctioned science that was ever pursued and cultivated by man,—the science of medicine."*

Forming a significant comment on these strongly presented and elevating claims, it was averred, in 1851, by Dr. Harris, that "there is a general tendency evinced by dental students to devote extra time to the practical departments at the expense of the regular lectures, and that it has required the stringent laws of the institution, and effort on the part of the faculty, to counteract this tendency."† And again, "The infirmary and mechanical rooms are so attractive, that it requires all the talent of our colleagues, and the stringent regulations of the school, to obtain sufficient consideration for the medical branches. The habit of dentists, such as dentists have been, and for the most part yet are, is to undervalue collateral scientific acquirements and make dentistry, as far as possible, a mechanical art."‡ Dr. James Taylor, also, writes, "I have found a greater disposition (on the part of the students) to obtain merely mechanical knowledge than I had hoped to see. . . . The first session we had over *twenty* students; since then, classes have ranged from *eight* to *fifteen*. *The first session students were not obliged to take all the tickets, subsequently* we have allowed *none but full-course students*, and hence those seeking *only mechanical knowledge* were shut out. Our object has been more to advance the interests of the profession than to obtain large classes."§

This tendency was strongly evidenced, in the schools as above stated, and in the growing ranks of the graduates, by the attention given to acquiring manipulative ability, and the multiplying of apparatuses and instrumental devices to this end; for it is certain that the wonderful increase in number and variety of character of such appliances is solely the result of an extraordinary demand for them.

Although not so strongly marked twenty-five years ago as now, the character of the rising practice was still easy to be determined, and propositions for averting what seemed an evil to many of the profession were everywhere presented. In 1842, Dr. Eleazer Parmly had spoken, in a meeting of the American Society of Dental Surgeons,‖ as follows: "It is now more than twenty years since I felt the urgent necessity of making the surgical and mechanical branches of the profession distinct. I regard them as being just as different in practice as the task of the skillful surgeon in amputating a limb, from that of the artist who, in the exercise of his mechanical ingenuity, contrives joints and springs, which, together with other admirable appliances, constitute an artificial one. Besides, I have never known, with a single exception, any one individual to excel greatly in both these departments of our art. It is here, as in Europe, the practice of most of our best educated dental surgeons to employ mechanics to do their artificial work, who never see the patients, —a practice which has never been found to answer in all cases the valuable purposes contemplated. . . . Therefore, while on the one hand I would persuade our well-educated men to confine their practice chiefly to operations on the living teeth, for the good of the profession and for the benefit of suffering humanity, I would as earnestly dissuade the mechanical dentists from all attempts at operations in the surgical department."

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* American Journal of Dental Science, 1st Series, vol. ii. p. 1.

† Ibid., 2d Series, vol ii. p. 71.

‡ Ibid., vol. i. p. 560.

§ Ibid., vol. ii. p. 71.

‖ Ibid., 1st Series, vol. iii. p. 8.

Although these ideas do not give prominence to the higher ground of prevention of disease which afterward took much stronger hold on the professional mind than it then had, and while Dr. Parmly evidently looked upon tooth-filling as the *summum bonum* of dentistry and not as being susceptible of classification as a mechanical operation, yet the extract is important as showing that even at that early day there was recognized an incongruity between the title of "dental surgeon" and the amount of strictly mechanical work which that "surgeon" was called upon to perform.

But as the problem of separation of these branches was one not easily—and perhaps even impossible—to be solved, it was never to any great extent advocated, and, though occasionally revived by individuals in after-years, was generally looked upon as entirely impracticable. It may be well, however, to remember that in all large cities, or places having the requisite facilities, the question was long ago virtually settled, as Dr. Parmly indicates, by the employment of specialists for most of what is known as "artificial work."

The main burden of the swelling cry was, that dentists were being fully educated as mechanics and tooth-fillers, but not so in the more scientific and theoretical part of the science of healing. Principally on this account was denied to them a formal recognition of educational, scientific, and professional equality by the older branch of general medicine. The New York Academy of Medicine, in 1848, refused to admit dental practitioners to membership, stating grounds purely technical as reasons.* And although, in reviewing this decision, a dentist stated that "No man can practice dental surgery upon scientific principles without practicing medicine every day of his life," and added that "its principles (those of dentistry) can only be learned by the study of the principles of medicine and surgery,"† and while such ideas were beginning to be largely held in the younger profession,—yet the doctors held to their formerly expressed opinions on the subject.

The most formidable of the schemes offered to counteract the claimed downward tendency of dental colleges was elaborated by, and found its most strenuous advocate in, Dr. E. B. Gardette, of Philadelphia, himself a professor in one of the colleges. The following is the text of his proposition, as reprinted from the *American Journal of Medical Science*:‡

"*On the Importance of Establishing a Lectureship on Dental Surgery in Medical Colleges.*

"The undersigned, a practicing dentist of Philadelphia, begs leave respectfully to call the attention of the trustees and medical faculties of the medical schools of the United States to the propriety and advantages of establishing an adjunct professorship to the chair of surgery, in which the specialty of dental surgery may be taught to the medical student seeking knowledge in your institutions.

"In making this suggestion, he indulges the confident belief that the existence of such a chair would be no less useful to those who may be compelled to practice some branch of dental surgery, as part of their duties in general surgery, than to the smaller number who may determine to embrace that specialty as their profession.

"The undersigned would offer for your consideration some reflections that seem to render this proposal consistent, not only with the wants of the student of medicine and the public, but with the duty and the interests of the medical schools which may act upon this request in such form as seems most proper to their own judgment.

"It will scarcely be assumed by any trustee, and still less by any member of a medical faculty, that the profession of the dentist or its duties are less important to mankind than any other of the specialties of surgery, whether the oculist, the aurist, or the lithotomist; and therefore it is needless to consider such a question open for debate, or requiring arguments in a country, especially, where the services of good dentists have been so widely and universally needed. It being granted, then, that the science itself is of equal importance with the other departments of surgery, it is an undeniable truth that, whilst all other specialties are taught and included in the professorships of medical schools generally, the principles and practice of dental surgery have received no attention, or certainly none that would permit the graduate of medicine to feel that he was qualified for the simplest duty of the dentist.

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* New York Dental Recorder, vol. ii. p. 236. † Ibid.

‡ Taken from the American Journal of Medical Science, April, 1851,—in the American Journal of Dental Science, 2d Series, vol. i. p. 395.

"Such a state of things was perhaps an unavoidable evil when men could not be found who were competent to teach the principles of our science, and when there was need of a comparatively small number of dentists, and hence no such aid was then called for from the medical colleges; but at this time there would seem to be required about twenty-five hundred dentists, more or less, throughout the United States, which is sufficiently proved by the fact that about that number are believed to be engaged in the practice of the profession, after some fashion or other—good, bad, and indifferent; and to supply an increasing demand for well-educated dental surgeons, as well as to raise the standard of that profession, would appear to be a matter of common interest.

"It would seem an act of inexplicable unkindness to have thus singled out the profession of dentist from among the specialties of surgery, and forced it into an attitude of independent self-protection; but a gentleman who fulfills the duties of both medical practitioner and dentist with such distinguished abilities as to be an honor to both professions,* has traced truthfully the origin of the neglect of which the dentist complains. The writer quotes from a valedictory address to the graduating class of the Baltimore College of Dental Surgery, March, 1850, when speaking of the early periods of the existence of a medical faculty:

"'They condemned, without stint, a calling they knew not how to practice, and a practice they knew not how to improve. Such of the faculty as were learned in their profession were found always competent and fully prepared to be oculists, aurists, or lithotomists, or to devote themselves to any other branch of the profession which their interest, inclination, or talents might determine, *except* that of dental surgery. This branch seemed to require something more than medical knowledge; it required great mechanical skill—an education of the hand as well as of the head—a kind of education they had not received, and knew not where to acquire, and yet affected to despise. The necessities of the community cried aloud to them for help—a help which they could not bestow. This drove many sufferers to seek dental aid out of the medical profession, and to obtain that help which mechanical genius alone could supply. At this the profession seemed mortified and chagrined, and loudly mocked at those who dared to supply their delinquencies, and united as one man in deriding the uneducated dental mechanic. They first created the necessity for an empiric, and then croaked forth their withering contempt on the creature their own ignorance had made.'

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* Dr. S. P. Hullihen.

"Thus has dental surgery been left to struggle through endless impediments and difficulties, instead of being regarded as a link, however humble, in the great chain of medical science, which should with patriarchal strength and harmony foster and embrace every branch of the healing art.

"It is now believed that, among the number of medical students who attend each of the schools, there are many who would gladly devote themselves to the specialty of dental surgery, and it is from these, and at the early age at which they generally devote themselves to medical studies, that good dentists could be formed; they should still be required to earn and receive a diploma with the title of M.D., as a guarantee of fitness to practice, and a claim to confidence as dentist. Even among the number that annually graduate, either to practice medicine generally, or limiting their attendance to their own families and dependents at the South, a correct knowledge of the theory and practice of dental surgery, such as might be derived from a course of lectures, would be highly valuable. And it is believed there would not only be a direct increase of good dentists, but a desirable addition to the number of those who should be competent to determine what constitutes a good dentist.

"The establishment of separate schools for each specialty in medical science (and why should there not be for the oculist, or aurist, as well as the dentist?) would appear to be the dismembering of a great family, thereby lessening its influence for good, as well as that power which is justly derived from an *esprit du corps* subsisting in every branch of an elevated and honorable profession. In this expression of opinion as to the ultimate tendency of dental colleges, the undersigned is actuated by no unkind or invidious feelings, but, on the contrary, he gives them due credit for the efforts they have made and are making to improve the profession; and to the Baltimore College of Dental Surgery he is personally grateful for acts of courtesy and kindness toward himself, and to the memory of his father.

"The educated dentists in the various parts of the United States are abundantly numerous, it is believed, to fulfil such duties as might be assigned them in each of our medical colleges. The students who now attend the dental schools would, in this event, be added to the number of matriculants in the medical classes of the country, and the need of separate institutions would cease.

"Frequent occasion for consultations between the physician, the surgeon, and the dentist, has been felt by almost every practitioner of medicine, as a necessary consequence of the connection and sympathy reciprocally existing between the teeth and many serious disturbances of the general health: such sympathies would naturally seem to suggest the mutual dependence between the physician, the surgeon, and the dentist, and should be a good reason for some similarity and sympathy in their modes of education. The benefits from such a state of things as the mind can readily anticipate would not rest here: medical men would sometimes, no doubt, receive important aid from the dentist, in tracing to their true origin many diseases of the head and face that now baffle their skill.

"Whatever action your medical faculty or board of trustees may see fit to take in reference to these suggestions, and the object they are designed to promote, the undersigned may at least respectfully urge that they would seem to demand fair and kindly consideration, as involving matters of deep concern to the community, for whose safety and advantage all medical learning is sought, and medical colleges instituted and fostered.—*E. B. Gardette.*"

In reviewing the above, Dr. Chapin A. Harris[*] advanced, as the principal argument in opposition, the impracticability of the scheme; saying, in substance, that there was not room for the addition of another chair to the already crowded faculties of medical colleges, without cutting off from the amount of instruction possible from them. He also claimed that the proposition was made at an "unfortunate time,"—the dental school having been years in attaining its present position of permanence; all the labor thus spent it was contemplated by Dr. Gardette to throw away, and the separate dental institutions to be abolished. He also contended that, "according to Dr. Gardette's scheme, all the medical students must be thoroughly instructed in dentistry. In the first place, they will not submit to any such thing;

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[*] American Journal of Dental Science, 2d Series, vol. i. p. 397.

in the next place, no adjunct professor could so instruct them, if they would. The course of medical studies in the college is now so extended, that, with all possible diligence, students cannot find time to get through with it in the four months' session, and general clamor is demanding an extension of the time. How will they find time for theoretical, and mechanical, and operative dentistry?"

On the whole, Dr. Harris exhibited much more acrimony in his treatment of Dr. Gardette's suggestion than was at all usual for him. Also, he assumed what was evidently not intended,—that Dr. Gardette had given a plan to be followed, instead of, as was the case, a suggestion to be elaborated.

Dr. Townsend, also, in the following number of the *American Journal of Dental Science,* combated Dr. Gardette's proposition on grounds generally similar to those advanced by Dr. Harris.

Dr. C. C. Allen* supported Dr. Gardette, saying, among other things, "The degree of D.D.S., if conferred with that care which should always be exercised, not to give it to unworthy candidates, must always be an honorable one; but we doubt if it would be *prima facie* evidence of as high a degree of merit as that of M.D. . . . We should be glad to see the profession of medicine a unity, and all its specialties under the broad seal of M.D., and we can see no good reason why this cannot and should not be the case."

Dr. B. Wood, of Nashville, advocated a scheme somewhat differing in detail, though not in principle, from Dr. Gardette's. His articles, as published in the periodicals of the day, are too long for entire insertion here; but as they contain the germ of a movement now put in practice in connection with three of our universities, they will be quoted at some length:

"It is not the design of this communication to take sides in the question [of education] referred to, much less to assume a hostile attitude in regard to either of the systems of dental education, the claims of which have been held up to consideration. Unquestionably each is *good* so far as it goes. If all our medical colleges were supplied with lectureships of dental surgery, and, at the same time, there were a dozen special schools of dentistry prospering throughout the country, there would certainly be little cause to *mourn* about it! Nevertheless, viewing lectureships as proposed, and dental colleges as now organized, in the light of complete systems of dental instruction, either must be regarded, we think, as measurably defective. If medical schools, including the branch of dental surgery in their curriculum, are to be the means of creating practical dentists, there should be additional means for this purpose, such at least as dental laboratories attached to such schools and provided with demonstrators of operative and mechanical dentistry; these should be attended by the dental students even to the omission of some of the less important medical branches; or the deficiency should be supplied by requiring a commensurate course of efficient private instruction. . . .

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* New York Dental Recorder, vol. v. p. 242.

"Impressed with the force of objections to our dental colleges, on the score of incompleteness in the department relating to general medicine, I took the liberty, upon a former occasion, to suggest the propriety of extending the term and range of their instruction so as to include a course of lectures in a regular medical school. The spirit in which the suggestion was noticed in a quarter which might be naturally expected to reflect the sentiment of faculties of dental colleges, seemed to indicate that to press the subject further would be not only unavailing, but obnoxious to those having control of these institutions. . . . This proposition is offered upon the belief that dental surgery is, and of right ought to be, a department of general medicine; that a knowledge of the latter is the true basis of correct practice in the former; that dental practitioners should be medical men, created from and belonging to the regular profession; that the student in this specialty must be in reality (though not of necessity *nominally*) a doctor of general medicine before he can be truly a doctor of dental surgery; and that a course of collegiate dental education should be such as *virtually* to entitle him to the honor of both.

"Dental surgery is generally conceded to be a medical science. It is so styled and treated of by the most eminent in our profession. . . . . This position . . . . has, moreover, been too strongly fortified by physiological and pathological facts and indications to admit of question. . . . This position being assumed, it leads to another, namely:—That a knowledge of medicine is necessary in the practice of dental surgery, as well as in any other specialty. This position also admits of ample confirmation. . . . No one will deny that in the practice of surgery, shorn of the 'dental,' a knowledge of medicine is indispensable. It is a settled conviction with medical men that 'no one can ever lay just claim even to the title of surgeon, far less hope for eminence or success, unless he be equally qualified to assume both the appellation and the employment of the physician.' And if dental surgery is entitled to or is ever to assume the rank we claim for it, a like qualification is no less indispensable on the part of its practitioners. Such is indeed the prevailing belief of the best informed dentists of the day, whatever system of education they have chosen to advocate. . . .

"With these views respecting the qualification required in dental surgery, the question arises, do dental colleges, as now organized, afford an adequate preparation for its practice? Is their range of medical instruction sufficient for the creation of scientific and reliable practitioners in this specialty? The title and tenor of this paper assume the negative. Admitting them to be good as far as they go, and as efficiently conducted as may be, yet their requirements would seem to be, of necessity, inadequate to the great end in view. . . .

"The course of instruction in dental colleges being admitted to be inadequate to the wants of our profession, we come at once to inquire what are the means for its extension and improvement? . . . . The only way to make any substantial improvement is to *extend the term of instruction*. . . . If a full and thorough training in operative and mechanical dentistry could be had under competent preceptors, so as to allow the whole time of the colleges for the elucidation of theoretical principles, there would be less urgency for this; but since such tuition is not generally accessible, or, if it were, is not required by these institutions, three collegiate courses were certainly none too much to insist upon. Moreover, this would not be more than equivalent to the customary term of study in medicine, which, in the United States, is uniformly three years; in Europe it is at least one or two years longer, while at the same time the preliminary requirements are higher, the branches of study more diversified, and the collegiate sessions longer. . . . The extension of the term of dental study, so as to occupy three years and include three collegiate courses, could be done either by prolonging the term in dental colleges, or requiring a preliminary course in medicine. In favor of the latter there is this prominent reason, that it would afford a greater amount of medical information, and at the same time allow dental schools room for doing better justice to dentistry. . . . . The importance of taking a general survey of the cardinal medical branches, before the mind is directed to special details, is a consideration of moment. It appears that there is an undue tendency on the part of the students to neglect the medical and theoretical branches taught in dental colleges, ... which fact of itself sufficiently indicates the propriety of teaching such branches in a preliminary course, where the attention would not be divided. . . .

If dentists are required to become well grounded in medicine, at the regular colleges, a union between the two professions is at once effected. The dismembered parts of a common science are connected by a natural link, lending mutual support to each other, and giving unity and strength to the whole. . . .

"It has been recommended by the American Medical Association to examine first-course students, and give them certificates of proficiency, etc. Such certificate (which could be regarded as an honor equal to that of Bachelor of Medicine, formerly granted), and a full course in a dental school, being prerequisite to graduation in the latter, would give a title to the degree of D.D.S., beyond dispute, which being thus made more honorable would be more sought after. . . . . It is vain to attempt to conceal or shuffle over the great and valid objection to these institutions, arising from the inadequacy of their range of instruction considered as a warrant for a doctorate, an objection which has ever been felt, and which must eventuate in their overthrow unless means be adopted for its removal." *

The first college to adopt other of the progressive ideas in vogue than an increase in the number of chairs, was the Philadelphia, which went into operation in November, 1852, one of its requisites for graduation being that the student "must have studied under a private preceptor at least two years, including his course of instruction in the college."† This, as has been seen, in some sort partially accomplished the idea of Dr. Wood. All the colleges gradually increased the number of their chairs, in obedience to the growing demand for higher scientific acquirements in dentistry.

But they made no radical step in the direction of a change. As formerly, they turned out good manipulators but poor scientists. At a meeting in New York City, September 6th, 1859, for the purpose of forming a State Dental Association, a paper was read from Dr. A. Westcott, of which the following is a condensation, forming still another plan for dental education:

"My position *was*, and *is*, that a certain number of years' practice as a dental surgeon should render one eligible, not necessarily to a *degree*, but simply to an *examination*. . . . I believe that every dental college should make practitioners, who are in good moral standing, and have practiced —— years, eligible to an *examination;* and if, *in fact*, they are found worthy the degree of doctor of dental surgery, it should be awarded them."* This plan, intended for practitioners of dentistry who were without degrees, was adopted by and is now in force under the New York State Dental Society, which body gives the degree of M.D.S. (Master of Dental Surgery).

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* American Journal of Dental Science, 2d Series, vol. iii. pp. 28 and 180.

† Ibid., p. 34, note.

In 1864, the American Dental Association passed the following resolution: "*Whereas*, In the opinion of the American Dental Association, no less than two years of pupilage in the office of a competent dentist, and attendance upon two full courses of lectures in a dental college, is necessary to qualify a student to practice dentistry properly; therefore *Resolved*, That practitioners of dentistry be requested not to take students for a less term than two years, and under no consideration unless they agree to attend lectures and graduate from a dental college before they enter upon the practice of their profession; and that the people should demand of all those who hereafter enter upon the practice of dentistry that they shall hold a diploma from a dental college, as the first requisite to public confidence and patronage."† The same resolution was also passed by the American Dental Convention, at Detroit, in that year.‡

In 1865, Dr. J. Smith Dodge, Jr., of New York, published a paper§ in which he advocated, as a basis for the then forming New York College of Dentistry, the substitution of the instruction given by the medical schools for the establishment of chairs on medical branches in the dental school. Said he, "Let the trustees of the proposed dental college select, without prejudice or favor, the best of the medical schools, and approach its faculty with this proposal: We desire to appoint the gentlemen who hold your professorships of anatomy, physiology, and chemistry to the same chairs in our college; they will instruct and examine our students, and sign our diplomas. We do not, however, wish them to repeat their customary lectures and demonstrations at our rooms, but desire that students matriculated with us may purchase the tickets of these professors and their demonstrators, and attend their instruction at your college, precisely as if they had matriculated with you. And we offer to reciprocate these privileges with regard to our special branches. . . . One word regarding the course of study. It has certainly been too lax. No man can be made a good dentist by attending two short courses of lectures. Let us imitate frankly the policy of the medical schools, and require certificates of three years' practical study, including two courses of lectures, and let there be no abatement for medical graduates, except that the lectures they attended in the common branches, while studying medicine, may count in place of the corresponding lectures in the dental course. This will exclude some hasty aspirants for the sheepskin, but it will mature those who undertake it, and at once place the New York school at the head of dental instruction, for all institutions of learning are universally judged by the severity of their requirements."

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* Dental Cosmos, vol. i. p. 133.

† Ibid., vol. vi. p. 91.

‡ Ibid., p. 112.

§ Ibid., vol. vii. p. 180.

Dr. J. H. McQuillen, in 1867, wrote as follows:*

"That a general knowledge of sciences may be acquired by persons of studious habits outside of colleges, with the aid of books, is, beyond a question of doubt, true. Persons of studious habits, however, are rather in the minority than in the majority, not only in the world at large, but also in the dental profession. A general knowledge of anatomy, physiology, chemistry, and the principles and practice of medicine and surgery, . . . is not sufficient for the practitioner of dentistry, for it is quite as indispensable that he should be as thoroughly acquainted with these sciences as the medical man."

In a communication read before the Association of the Colleges of Dentistry, in 1866,† Dr. James E. Garretson made the following remarks: "The conviction is forced upon us . . . . that, for the support of the doctorate assumed by the dentist, the greatest change must be effected in the matters of his education and duties, for his present scientific attainments and sphere of duties are too restricted; the proofs being—

"1st. That graduates of dental colleges manifest to the world their inability to treat any disease outside of those associated with a few simple semi-vital organs, which diseases require for treatment much more the skill of a mechanician than that which the world recognizes as a doctor's.

"2d. That their attainments are understood by the community to be not of the same general character as those of other regular specialists, proven by the fact that, while all other specialists are understood as being proper doctors, and so received and consulted, the dentist is not."

The principal cause for the last proposition of Dr. Garretson might be easily shown to be, not so much the want of scientific attainments (though this was, and is, sufficiently well marked), as the fact of their bearing the new and strange degree of D.D.S., a title not generally understood, and one which its possessors certainly did little, in the public view at least, to render scientifically honored, valued, or known. Although the dental colleges have given to the profession between two and three thousand regular graduates, it is certain that there are extremely few of these (who have not also secured the degree of M.D.) of whom it may be said that they are among our scientific dentists. It is a fact patent to every observant person, and well known to all thinking dentists, that the very great majority of the scientifically best men in the profession are graduates in general medicine. There are some, indeed, of high professional attainments, who bear no degree or title; but these very evidently belong to that class of studious persons who, as Dr. McQuillen quite too moderately observed, "are rather in the minority than in the majority."

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* Dental Cosmos, vol. viii. p. 513.

† Ibid., p. 186.

The present Philadelphia College, upon its organization in 1863, proposed to establish a higher grade of instruction, and to turn out better qualified graduates, than had before been attempted. In the words of Dr. Garretson, "This enlarged sphere consists in the conversion of the present specialty into that of oral surgery. To this end, the student entering this school has offered to him every advantage in the way of the study of general surgery that is presented in any university or college in the country. Dissections, clinical observations, attendance on didactic and demonstrative discourses, are necessary to his obtaining the highest honors of the school, or of receiving its endorsement as an oral surgeon, such general study being accepted as absolutely necessary to the position assumed. Qualified by such a course to meet the emergencies of general surgical practice, and as fully qualified according to his ability as he could elsewhere become, his studies continue with a more and more direct application to oral diseases, beginning with the teeth and ending with the complexities of the subject."*

These changes, strictly adhered to, doubtless increased the value of the school in question, and even had the effect to bring up the other schools to their level in these respects; and to-day such institutions (with few exceptions) are nearly on a par with one another as to the character of their curriculums, all claiming equally high grounds. But it is a significant fact that, in spite of these changes for the better, they have not raised the status of the D.D.S. in either the public or the professional view. This cannot be better proved than by exhibiting more recent opinions on the subject.

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* Dental Cosmos, vol. viii. p. 187.

Dr. George T. Barker, himself, as he states, an earnest advocate for dental colleges, wrote as follows in 1873:* "If asked what in my judgment would best advance the interests of dental education, I would answer, reorganize and consolidate the existing dental colleges, establishing as their successors two or three national dental colleges, with faculties selected from the best dental teachers in the land, so situated that they would be convenient to large sections of country, and not liable to react upon each other, with uniform fees for attendance and graduation, and such endowment that the greater portion of the time of the teachers could be devoted to the preparation and delivery of carefully-prepared lectures. In this way the best interests of the student and practitioner would be subserved; positions would not be held for honor merely, as is now the case. . . . Another point worthy of thought is the necessity for a preparatory course for dental students which will fit them more perfectly for entrance as students into dental colleges. . . . By attendance for a session at such a preparatory school, the student would be better fitted to appropriate the material subsequently offered in colleges. . . . In conversation with graduates and students for the past fifteen years, I have found numbers who are aware of and recognize the short-comings of dental education and dental colleges, and the conviction has been generally expressed that the curriculum of study should be made more practical, more comprehensive and extended, and more in accordance with modern ideas and improvements."

"Admitting all that has been charged (against dental colleges), it is simply an *abuse*, which in no wise touches the principles or impairs the system upon which these institutions were founded; and we may rest assured that whatever errors or imperfections may now exist will be speedily corrected by a wholesome professional sentiment which no school can resist and live. Our colleges *must* meet the demands of the age, or go down and be succeeded by others in harmony with the times, and measuring up to all the duties and responsibilities of advanced and advancing science."—*Dr. W. W. H. Thackston*, 1874.†

"Great imperfection exists in the education of dental students, or, at least, much more might be done than is accomplished by the course now generally pursued. This is true not only of private or office instruction, but of that given in the schools. . . . It is hardly necessary to refer to the present status of dental education. It is quite apparent to any close observer that it is very defective; its imperfections are shown upon every hand."—*Dr. J. Taft*, 1874.*

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* Dental Cosmos, vol. xv. p. 25.

† Ibid., vol. xvi. p. 271.

"The colleges are the levelers of the standard of the profession. If they will declare for a studentship of three years, the profession will at once acquiesce in the decree, and in no case are they excusable for granting honorary degrees, except where eminence has been attained by long years of toil and study."—*Report to the Michigan State Dental Society*, 1875.†

"On close inspection into the workings of dental colleges, it will be perceived that, although they have in no wise deteriorated in the quality or retrograded in modes of teaching, yet the charge of inefficiency made against them is not entirely groundless, for they have been remiss, if in nothing else, in failing to elevate the standard of professional education proportionately with the wider scope and greater range which dentistry as a specialty of medicine has taken in the domain of science. . . . A serious defect in the teachings of dental colleges, one which has given the most cause for dissatisfaction, arises from the common usage they practice of graduating students on attending only two sessions; which is tantamount to making dentists of them in eight months of actual methodical studies; for it is a well-known fact that during the interim between the lecture seasons little if any progress is made by them, in consequence of the unsystematic and desultory manner in which they pursue their studies. . . . The adoption of reformatory measures for improving, and keeping up the standard of, dental education, is no less a duty which dental colleges owe the profession, than it is a matter of self-preservation. For, at the rate they are now manufacturing an inferior grade of dentists, with many exceptions, be it said, the profession at no distant day is destined to become *overrun*."—*Report on Dental Education to the American Dental Association*, 1874.‡

Within a few years no less than three of our universities have so far been impressed with the importance of the subject of dental education as to constitute, in connection with their medical departments, dental schools. These are, in the order of their appearance, Harvard, and the Michigan and California Universities. The last of these is not yet in working order.

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* Dental Register of the West, vol. xxviii. p. 377.

† Ibid., vol. xxix. p. 181.

‡ Transactions of the American Dental Association for 1874, p. 153.

The Harvard Dental School ranks, probably, highest of any in the country, alike in the standard of qualifications necessary to graduation, the extent and value of the curriculum, and the general professional estimation. This school has, very lately, taken a still higher standpoint for the education of its students, as embodied in its most recent circular, which will be found in the chapter on "Dental Colleges."

The very general and wide-spread demand for higher scientific culture among dental practitioners has already been indicated by the previous quotations relating to dental colleges, and will be further shown, as to the general question, as follows:

"The community is learning to appreciate the advantages of special training, and naturally seeks advice from those who have devoted themselves to the study of the particular derangements from which it is suffering; and, if we read aright the signs of the times, it is also being rapidly educated into an appreciation of the necessity of a scientific basis for medical practice of whatever character. It will demand, ere long, that he who aspires in any way to the title or the avocation of a doctor shall base his claims on a broad and comprehensive medical culture,—not only the minute and accurate observation of one organ or one class of diseases, but the knowledge and application of principles.

"To apply these facts to the practice of dentistry compels the conclusion that the choice must be made by its practitioners whether they will occupy the position of mechanics or artisans, or qualify themselves to be medical specialists. To refuse to see that great changes are at hand, as concerns the standing and practice of the dental profession, is simply to shut one's eyes. Of no one thing are we more fully assured than that the dentistry of to-day must either advance or give place; to attempt to confine it to its present limits is to seek to control that progress which is itself evolution. . . . The establishment of a lectureship on oral surgery in the University of Pennsylvania, the recognition by Harvard University of the propriety of associating teachers of dentistry with its faculties, the quick sale of the entire edition of a volume devoted to the consideration of diseases of the teeth and parts topographically associated, —these and other facts of like import are the signs of the times. . . . Let those now entering the ranks of dentistry take warning. No mechanical skill, however scientific; no artistic culture, however perfect, will in the near future rank for anything more than their stamp. Commendable, honorable, remunerative they may be, but they will not long command recognition as entitling their possessor to a place in the ranks of a learned profession."—*Dr. J. W. White.*[*]

"The branch of dental surgery is certainly a legitimate specialty of medicine. It should assume its true functions in the healing art, and its relation to the medical profession in general. Its practical processes should be controlled by the principles of medical science. Granting this, the basic elements of dental practice will be found in a thorough study of the whole physical organism.

"A satisfactory acquaintance with these ground truths should hereafter be required of every student of dental science, as the first step to bring our specialty into its normal relations to the general system from which it is a legitimate offshoot. The time has gone by when mere mechanical skill, with a few general ideas, picked up in desultory miscellaneous reading, can be regarded as a preparation for the serious and delicate responsibilities of the dental practitioner. He is a member of a learned profession, to whom the community look up with increasing respect in proportion as those qualities develop. Knowledge, which is power in every other branch of human activity, is no less such in that branch of the healing art which takes cognizance of one of the most important functions of the human economy. . . . The requirements of practice are daily calling for a more advanced and scientific intelligence, and they who minister to these demands must have laid up in their mental organization the natural and acquired abilities to grapple with the ever increasing responsibilities."—*Dr. G. W. Keely.*[†]

"It is true that many shining lights in the dental profession did not enjoy the preliminary education which is now felt to be an essential to the highest professional excellence. By virtue of untiring effort and great natural ability, they have achieved eminence and success in spite of these déficiencies. Such are the men who, enlightened by experience, would have the future members of the profession enter upon its duties unburdened and untrammeled, and thoroughly furnished with all mental requisites for their work. Such are the men who are earnestly laboring for the advancement of dental science.

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[*] Dental Cosmos, vol. xiv. p. 608.

[†] Report on "Dental Education," American Dental Association, Transactions of 1874, p. 159.

The assumption of its responsibilities at the present day, without far better preparation than the older practitioners enjoyed, argues a failure to comprehend these obligations, or a criminal indifference to them.

"The requirements of dental practice are constantly enlarging, and can be met only by a deeper and more intelligent study of fundamental principles, and a more perfect adaptation of them in practice. The truths of the profoundest science must be embodied in the most intelligent and elaborate processes of art. Hence, dental surgery, like every other profession, demands equal facility in abstract investigation and in concrete adaptation.

"These seemingly diverse tendencies (the ideal and practical) must be brought into harmonious combination if we would bring into the profession minds capable of achieving its highest beneficent results. In the discussions of a dental society these two tendencies of mind will find special admirers, each of whom, if not careful to control their previous impressions, will be apt to depreciate the characteristics which least impress their minds. . . . Some are disposed to lay too much stress on profound scientific indoctrination, supposing that the practical elements of professional character will develop themselves, or, at least, require much less effort at culture; others overvalue practical skill at the expense of fundamental knowledge of principles. Both of these extreme tendencies are to be corrected, and a system of professional education inaugurated which shall harmonize them in the highest results. Such are the views of the leading minds of the profession."

The various questions before the profession are well enumerated, as follows, in the report from which the above is extracted:

"How shall dental education be conducted to secure the essential points previously enumerated? How shall minds unfit for its reception be prevented from engaging in its preparation? How shall dental surgery be relieved from the dead weight which embarrasses it in common with other learned professions? Shall civil authority be called upon to prescribe professional qualifications, and to repel by penal enactments the intrusion of unworthy practitioners, or shall the profession resolutely refuse fellowship with any but the worthy and well qualified? What tests of ability, talent, and character shall be prescribed? What literary and scientific culture shall be demanded as a preliminary to professional training? Again, dental surgery being but a specialty of medicine, how shall the fundamental indoctrination in anatomy, physiology, pathology, chemistry, and all other branches of a thorough medical education be secured? Shall the regular medical colleges recognize the specialty and adapt their tuition to its requirements? Or shall the dental college call to its aid the medical professor, and thus supply the lack of basic professional culture?"—*Dr. G. W. Keely.*[*]

The above questions have each received much attention from the general profession; and, among others, that relating to the preliminary qualifications of students has attracted sufficient notice to deserve special treatment here. The following are to this point:

"We should always bear in mind that in the proper selection of our students lies the power of the elevation of our profession. They should have a good English education, at least. They should be persons of a fair degree of natural ability and mechanical skill. Then let them understand that they have entered upon no short-cut, easy way to a livelihood, merely, but that they should avail themselves of the best facilities for instruction."—*Dr. A. W. Freeman.*[†]

"*Whereas,* The present interests of the dental profession require a more liberal education on the part of those who shall henceforth enter its ranks; and *whereas,* It is notorious that the instruction imparted to students by private preceptors is sadly inadequate even to prepare them to enter upon a course of lectures in a dental college; therefore

"*Resolved,* That we, as members of the American Dental Convention, do enter our most solemn protest against the loose method so common among preceptors, of merely allowing students to remain in the laboratory to pick up what little knowledge they may.

"*Resolved,* That it is the belief of this Society that no person should be admitted as a student of dentistry who is not fully qualified mentally, morally, and physically, nor for a less term than three years, and that a thorough course of instruction should be enforced, and a sufficient amount of time devoted by the preceptor to thoroughly prepare his pupil to enter upon a course of lectures in a dental college, with a sure foundation already laid, upon which may be built a professional character which shall make him an ornament to the profession, and a credit as well to his preceptor as to his Alma Mater."—*American Dental Convention,* 1868.[‡]

"*Resolved,* That it is the sense of this Association that no dental student should be graduated from any dental college without at least three years' instruction, including private pupilage and college instruction; the latter should in no case embrace less than two full regular courses."—*American Dental Association.*[*]

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[*] Report on "Dental Education," American Dental Association, Transactions of 1875, p. 135.

[†] Missouri Dental Journal, vol. vii. p. 351.

[‡] Dental Cosmos, vol. x. p. 413.

"*Resolved,* That this Association recommends to all local societies the adoption of rules prohibiting their members from taking students for a less period than three years, or for such time as will complete a three years' pupilage."—*American Dental Association.*[†]

"Perhaps there has been no greater obstacle to the still more rapid advance of our specialty, or in the failure of its appreciative recognition, than the too prevalent opinion that it is a *trade,* easily acquired by young men of even ordinary capacity in a short space of time. Nor can this impression be eradicated from the minds of the people until we, who are devoted to its interest, shall enforce strict regulations governing dental pupilage."—*Dr. C. A. Kitchen.*[‡]

Another phase of the more recent discussions on dental education, as indicated by the last three questions of Dr. Keely, is, the claims of dentistry on medicine. This matter had been discussed during many years, in a desultory manner, but has of late become prominent to a degree before unknown. Its importance is very generally admitted, because in the solution of it evidently lies the future of, at least, American dentistry; and is easily proved by the fact that those highest in the profession are most actively engaged in its discussion. Its exhibition will be attempted by a series of extracts which shall present the main points advanced and in issue.

In an editorial in the *Dental Cosmos,*[§] Dr. J. W. White happily illustrates the relative positions of dentistry and medicine. The following are extracts sufficient to show his position:

"A correspondent, renewing his subscription to the *Dental Cosmos,* writes, 'Try and let us have more dentistry and less medicine.' 'Do you ever read the *Dental Cosmos?*' said one physician to another, in the hearing of the writer, a few days since. 'No,' was the reply; 'it takes all my spare time to keep posted in medicine.' In both these remarks is evinced the false conception—shared, unfortunately, by large numbers in both professions—that there is a dividing line so separating dentistry from medicine that the practitioner of either division may afford to ignore all that belongs to the circle of the other. The mistake of both alike is in the assumption that an arbitrary division in a chain of physiological and pathological action is possible.

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[*] Transactions, 1875, p. 14.

[†] Ibid.

[‡] Transactions Illinois State Dental Society, 1874, p. 28.

[§] Vol. xv. p. 78.

"A recent writer has truthfully remarked, in substance, that in no department of medical science has there existed such a hiatus as yawns between the professions of general medicine and surgery and that of dentistry,—a missing span in the bridge of practice. A patient, trusting a complex oral disease to the average dentist, fails because of the absence of surgical knowledge and skill; approaching from the side of medicine, he fails by reason of a corresponding deficiency, as common and as unjustifiable, in the general medical practitioner. . . . The community, rapidly attaining the ability to recognize and the readiness to question, will soon be dissatisfied with a practitioner, general or special, who manifests ignorance of this physiological and pathological circle, and the surgical and therapeutic indications.

"It does not follow that a better comprehension of these relations and their significance by the physician will necessitate operative skill, any more than a like appreciation by the dentist will relieve him of the necessity for the highest manipulative ability, or compel him to general practice; but the dentist should be competent and quick to diagnose systemic causes of local lesions, and the physician to diagnose the local causes of systemic inharmony; and the professions will respect each the other as they recognize that, standing on a common platform, and with common honors, they divide into specialties but for the common good, and that greater skill may be acquired by limiting the field of special practice."

In support of Dr. White's statement, as far, at least, as regards the position of medical men, the following is quoted from an editorial in the *Philadelphia Medical Times* (1875) which bore reference to a then recent meeting of the New York Odontological Society. Said the *Times*, "Let editors write as they may, conventions debate, discuss or pass resolutions as they please, one thing is certain: that D.D.S. is the badge of a partial culture, and that the medical profession never will stultify itself by recognizing as coequal or as a part of itself a profession to the highest positions in whose ranks such a degree is the only necessity for entrance. It may do very well for gentlemen who place only their medical degrees on their door-plates before the world to affirm in convention that they prize the D.D.S. above the M.D., but in doing so they only make themselves singular; they do not affect or reflect the general public opinion. Those gentlemen who look upon dentistry as belonging to medicine should weigh well the words of Dr. Garretson. On behalf of the medical profession, we freely admit that many, it may be all, of the dentists who took part in the debate at the Odontological Society, far exceed, in point of general, literary, scientific, and even in special medical culture, many of our physicians. But that does not affect the question. The medical profession is perfectly willing to admit dentists to its fraternity so soon as they become doctors of medicine, but never whilst they are merely doctors of dentistry. Really, the physicians are, in great part, indifferent in this matter; but just so soon as the universal law of the medical profession—that the specialist shall first be a general practitioner, and shall have no special degree—is complied with, the medical profession will at once assimilate this great new body."

The remarks of Dr. Garretson above referred to were, partly, as follows: "Most decidedly am I, for one, in favor of the abolishment of the degree of D.D.S. One degree in medicine is enough; the greater covers the lesser, and includes it. A doctor in medicine possesses a title quite extensive enough in its signification to embrace any specialty that he may elect to practice; besides, it affords the only possible bond of brotherhood with the members of the profession at large. We may be specialists, but we can never be esteemed as doctors, in the desirable fullness of the term, until we replace the D.D.S. with the M.D. . . . I, then, and those who think with me urge a new departure for our specialty; a departure which shall be general; a departure which shall distinguish our status in the future, and which shall make us worthy children of the common Alma Mater Medicinæ."*

"The question is not what dentistry has been, but what oral surgery should be; not what are the qualifications of those now practicing it, but what is its legitimate province, and what the requirements for its intelligent practice. We see no force in the assumption that because the great bulk of the profession have heretofore spent their lives in a monotonous round of purely mechanical labor, therefore they must continue to do so in the future. We claim that the circle of physiological and pathological sympathies existing between the mouth and every portion of the economy demands, first, a general medical education, and then special training, that the highest results in treatment may be secured. And as each year witnesses a more thorough educational training, so will the field inevitably widen, until the function of the dentist will be merged into a practice of which that of to-day is but a feeble indication. . . . As to the necessity for special schools for any department of medicine, that is a question open for discussion; but a complete medical education having been obtained as a foundation, on this basis the study and practice of any specialty are entitled to the respect and confidence not only of the community, but of all who base their claim to recognition on a like scientific preparation."—*Dr. J. W. White.*[*]

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* Transactions of the New York Odontological Society for 1874, p. 132.

"We have seen that the dentist is a special physician and surgeon, and we are therefore forced to the necessary conclusion that he who is not possessed of the education and skill requisite to make him a dental physician and surgeon is not a dentist, and should not be recognized as such by the public. What, then, should be the education of the coming dentist? Evidently, in general terms, such as to prepare him to practice medicine and surgery as a dental specialty. His education should be as thorough and complete as that of the general physician and surgeon. He need not, necessarily, be able to prescribe or operate for the cure of diseases outside of his specialty; but, as the general principles and the fundamental sciences that underlie and form the superstructure of the science and art of healing are the same in all departments of cure, they should be equally well understood by all curists."—*Michigan State Dental Society.*[†]

"Dentistry is a specialty of medicine, and should be taught as such. That it is a specialty of medicine is, we believe, the highest claim that has ever been made for it. If this claim is founded upon truth, what is the legitimate inference as to how a knowledge of it should be acquired? Surely that it should be taught and learned in connection with a medical college, as are other specialties of medicine. Men should be qualified for the practice of dentistry, as is the surgeon, aurist, or oculist, upon the broad basis of a general knowledge of medicine."—*Dr. W. H. Morgan.*[‡]

"If we desire to be recognized as specialists of the medical profession, we should first make ourselves such. If we desire to occupy exactly the same position that other medical men occupy, we should educate ourselves as other medical men are educated; and it appears to me the best way to do this is in a medical college. The medical profession appropriate as teachers all of the best material, and if we desire to have the benefit of those teachings, so far as the medical part of a dental education is concerned, we must get it where the best teachers are employed."—*Dr. Judd.*[*]

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[*] Dental Cosmos, vol. xv. p. 642.

[†] Dental Register of the West, vol. xxv. p. 239.

[‡] Transactions of the American Dental Association for 1873, p. 160, Report on Dental Education.

In conclusion may be aptly requoted, as a correct expression of the present feeling in the best minds of the profession of to-day, that saying of Dr. Horace H. Hayden's, which, though enunciated over thirty years ago, still retains all its original force of truth and earnestness of high purpose:—"We assume the title and claim the rights and privileges of being the studious, diligent, and successful cultivators of at least a branch of that important, noble, and only divinely sanctioned science that was ever pursued and cultivated by man,—the science of medicine."

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[*] Transactions of the American Dental Association for 1874, p. 184.

TABLE OF DENTAL CENSUS FOR 1850, 1860, AND 1870, ARRANGED BY STATES.

COMPILED FROM THE UNITED STATES CENSUS REPORTS.

STATES AND TERRITORIES.	NUMBER OF DENTISTS IN		
	1850.	1860.	1870.
Alabama	71	145	114
Arkansas	5	82	89
California	20	121	189
Connecticut	55	155	158
Delaware	12	21	24
Florida	4	20	20
Georgia	79	160	167
Illinois	56	190	520
Indiana	67	154	842
Iowa	10	76	225
Kansas	...	14	72
Kentucky	62	188	190
Louisiana	62	89	99
Maine	65	107	189
Maryland	81	114	179
Massachusetts	267	421	485
Michigan	82	131	259
Minnesota	...	20	48
Mississippi	51	108	118
Missouri	89	140	271
Nebraska	...	...	14
Nevada	...	...	9
New Hampshire	44	87	77
New Jersey	61	130	216
New York	568	964	1846
North Carolina	84	83	95
Ohio	251	407	601
Oregon	...	13	29
Pennsylvania	566	806	924
Rhode Island	82	43	55
South Carolina	58	84	59
Tennessee	84	116	138
Texas	13	65	102
Vermont	45	73	88
Virginia	140	196	198
West Virginia	...	...	27
Wisconsin	19	119	142
District of Columbia	25	48	*...
Territories	5	21	76
Total	2923	5606	7839
Graduates of Dental Colleges since last census			893
Total to date			8782

* Included in Territories.

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